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l. 6 August 1955 No. 8

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Vol. 6 AUGUST, 1955 No. 8

AGRICULTURE · COMMERCE · AERIAL AND MARINE NAVIGATION · PUBLIC HEALTH · INDUSTRY · ENGINEERING
AMERICAN METEOROLOGICAL SOCIETY
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SPECIAL FEATURE IN THIS ISSUE

An Annotated Bibliography on Atmospheric Nuclei (1841–1950)

by
Nina S. Zikeev

(*For complete table of contents see back cover*)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, etc., arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of important references on a special subject. No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
5. Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
9. Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

1. Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
5. Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm Detect.
9. Condensation Trails	10. Clim. of N.E. Africa	11. Mountain Met.	

Vol. III, 1952

1. Clim. of N.W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
5. Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
9. Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

1. Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc.
5. High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
9. Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V, 1954

1. Oceanog. Met.	2. Clim. of S.E. Asia	3. Auroral Physics	4. Tropopause
5. Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
9. Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Bibliographies published this year are:

1. **Bibliography of Bibliographies on Meteorology,** Vol. 6, No. 1, Jan. 1955
2. **Textbooks and Monographs Containing Subject Bibliographies,** Vol. 6, No. 2, Feb. 1955
3. **Storm Surges,** Vol. 6, No. 3, March 1955
4. **Ionospheric Propagation,** Vol. 6, No. 4, April 1955
5. **Photochemistry of Upper Atmosphere,** Vol 6, No. 5, May 1955
6. **Cloud Physics,** Vol. 6, No. 6, June 1955
7. **Radar Cloud Physics,** Vol. 6, No. 7, July 1955
8. **Atmospheric Nuclei (1841–1950),** Vol. 6, No. 8, Aug. 1955

Forthcoming bibliographies will be:

9. **Atmospheric Nuclei (1951–1955),** Vol. 6, No. 9, Sept. 1955

Other bibliographies in preparation are:

Actinometers	*Night Airglow*
Arctic Synoptic Meteorology	*Ocean-Atmosphere Energy Exchange*
Climate of the Arctic	*Ozone*
Cosmic Rays in the Atmosphere	*Singularities*
Fog Forecasting	*Snow Cover*
Indoor Climatology	*Synoptic Aerology*
Microwave Propagation	*Tropical Cyclones*

Part III contains a listing of the contents of those journals which are primarily meteorological. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the December issue cumulative author, subject, geographical and journal indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory (and American Meteorological Society) Library, Milton, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts

Geographic locations are in the English form rather than the form used locally, for example Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

GENERAL AND SPECIAL

MAJOR, GENERAL AND COLLECTED WORKS

6.8–1 628.53 551.510.42

Great Britain. Committee on Air Pollution, **Report. Presented to Parliament by the Minister of Housing and Local Government, the Secretary of State for Scotland and the Minister of Fuel and Power by Command of Her Majesty November 1954.** Cmd 9322. London, H.M.S.O., **1954.** 80 p. fig., tables, 6 refs. **GB-MO**—The report of the Committee (Chairman, H. BEAVER) describes air pollution as a social and economic evil which can no longer be tolerated. The smoke, grit and SO_2 discharged by various forms of fuel in 1953 are tabulated. Death rates from respiratory diseases per 100,000 are 120 in towns of population over 100,000; 95 under 50,000. Cost of air pollution (direct costs and loss of efficiency) is estimated as £250 million a year. Methods of measuring smoke and of reducing smoke and grit are discussed. Discharge of SO_2 is 5¼ million tons a year and possibilities of removing it are discussed. Methods of reducing railway smoke including electrification and use of diesel engines. For domestic smoke the extension of smokeless zones and smoke control areas by use of smokeless fuel is recommended. Appendices include (among others) measurement of smoke, influence of chimney design and height on dispersion of flue gases, and measurement of air pollution. *Subject Headings:* **1. Atmospheric pollution control 2. Atmospheric pollution effects.**—*C.E.P.B.*

6.8–2 551.5:629.13 551.594.7

Conference on Radio Meteorology, Nov. 9–12, 1953, Texas Univ., Austin, Texas, **Proceedings** [Vol. 1], **Supplement.** Pub. by Bureau of Engineering Research, Univ. of Texas, Austin, pref. **1954.** each section repaged. **DWB**—This Supplement to the Proceedings of the Conference on Radio Meteorology at Austin, Tex., Nov. 1953 (*see item* 5.7–3, July 1954, *MAB*) contains 17 papers on the various aspects of radio propagation, radar meteorology, turbulence, cloud and thunderstorm physics and 11 pages of discussion on the various subjects covered in the conference, corrections on papers in Vol. I, and a list of names and addresses of the participants. Papers contained herein, by CARROLL, BEAN and MEANEY, OGURA and MIYAKODA, HERBERT JONES, WEIL, NEWMAN and STAHMANN, PIERCE and WORMELL, NEWMAN, E. L. HILL, S. E. REYNOLDS, BEMIS and FLEISHER, EVANS and STONE, BLACKMAN, LIGDA and V. G. MILES, will be abstracted separately. For contents of Supplement *see* p. 975–976, Aug. 1954, *MAB*. *Subject Headings:* **1. Tropospheric radio wave propagation 2. Radar storm detection 3. Cloud physics 4. Conference reports.**—*M.R.*

6.8–3 551.578(084.4)

*†U. S. Corps of Engineers, **Depth of snow cover in the Northern Hemisphere.** Prepared by Arctic Construction and Frost Effects Laboratory, New England Division, Boston, Mass. June **1954.** 4 p. 35 cm×57 cm. 14 tables, 38 diagrs., 80 refs. *U. S. Corps of Engineers, Investigation of Construction and Maintenance of Airdromes on Ice, Fiscal Year 1954.* **DWB**—Elaborate monthly charts of the average, maximum and minimum snow depth in the Northern Hemisphere at end of month with topography represented by different colors and data indicated by numbers printed adjacent to station location data; and isarithms of snow depth drawn for all of the plains regions where depths exceed one inch (e.g., Eastern Canada and as far south as mid-Texas to mid-Georgia to northern boundary of Persia in Jan. and Feb. where the greatest depths occur). Actual data for 1931–50 for each of 520 stations arranged by latitude

belts in Western and Eastern Hemisphere appear in tabular form. Snow cover frequency curves (depth of 0, 2, 5, 10, 20, 25, 30″) by months are also given for 312 stations (135 in U.S.S.R.). *Subject Headings:* **1. Snow cover atlas 2. Snow depth data 3. Northern Hemisphere.**—*M.R.*

6.8–4 551.5

Webber, John P.; Conover, John; Wexler, Raymond and others, **Blue Hill Meteorological Observatory, Contract CWB-8310, Final Report, 1952–53.** Feb. 19, **1954.** 66 p. 22 figs. (incl. photostats and photos), tables, 27 refs. **DWB**—Contents: 1, Webber, J. P., **Discussion of revised charts of vertical velocity for storm of Jan. 7–8, 1951;** 2, Conover, John H., **The effects of orography on precipitation amounts over the metropolitan area;** 3, Wexler, Raymond and others, **Atmospheric cooling by melting snow;** 4, Brooks, Charles F. and Eleanor S., **Snow or rain?;** 5, Conover, John H., **Collection and processing of world weather reviews;** 6, Webber, John P., critique of **"Forecast manual for New England";** 7, **Reports of current weather at Blue Hill.** *Subject Headings:* **1. Meteorological research 2. Blue Hill, Mass.**—*M.R.*

TEXTBOOKS

See also: **Maritime met.** (Seilkopf), 6.8–59.

6.8–5 551.584

Franklin, T. Bedford, **Climates in miniature: a study of microclimate and environment.** London, Faber and Faber, **1955.** 137 p. 10 figs., 8 plates, 11 tables. **DWB**—This well written popular book is mainly based on the author's own experiments. Ch. 2 describes temperatures at different levels in rabbit burrows and in badger sets, hedgehog and birds' nests. Ch. 3 describes climate of cranberry marshes, Ch. 4—effect of different soils. Chs. 5–12 deal with earth temperatures in general, "what happens to the rain," frost and frost hollows, air temperatures over different surfaces and in different exposures, humidity, dew and dew-ponds, wind and shelter belts, light and shade. In Ch. 13 the microclimates of cloches and frames made of glass and plastic are compared (to the advantage of glass) and principles of artificial heating are set out. Ch. 14 deals with forage crops and the effect of organic manure on soil temperature. Ch. 15, **Microclimates in the home,** discusses heat gains and losses in housing and effect of clothing. *Subject Heading:* **1. Microclimatology.**—*C.E.P.B.*

6.8–6 656.61

†Gabler, Heinz, **Nautische Technik (Formeln, Diagramme, Tabellen).** [Navigation (formulas, diagrams, tables).] *Deutsche Hydrographische Zeitschrift, Ergänzungsheft,* No. 3, **1955.** 151 p. 93 figs., 8 tables, bibl. p. 147–151, 347 eqs. **DWB**—This book deals with the theory of navigation. Pt. 1 describes the compass, determination of errors, various methods of remote indications, gyro-compass, etc. Pt. 2 discusses optical methods of navigation, visibility, optical instruments and colored glasses. Pt. 3 is concerned with radionavigation, including loran, decca and radar systems. Pt. 4 covers the theory of sound as an aid to navigation, echo sounding and the transmission of audible and infra-audible signals through water. Finally, Pt. 5 deals briefly with automatic course-plotting. The tables give the fundamental physical quantities. There is a very full bibliography. *Subject Heading:* **1. Marine navigation.**—*C.E.P.B.*

6.8–7 551:140.8

†Wachsmuth, Guenther, **Erde und Mensch, ihre Bildekräfte, Rhythmen und Lebensprozesse.** [Earth and man, their creative force, rhythm and life-process.] 2nd enl. ed. Kreuzlingen, Archimedes Verlag, **1952.** 448 p. 116 figs., numerous foot-refs. **DLC**—Starting with the novel theory that the earth itself, as well as life thereon, is a living and almost a breathing organism, the author goes on to list a large amount of geophysical, physical, biological and astronomical information (seemingly up-to-date and accurate), by means of elaborate models of the earth from its core to the exosphere. The daily rhythms in all phenomena (tides, winds, heat, moisture, ozone, magnetism, auroras, etc.) are cited as factors

in this "breathing" of the earth and are represented by beautiful color diagrams of unbelievable complexity. This volume represents a nice attempt at building up a philosophical system from a mass of data. *Subject Headings:* **1. Geomorphology 2. Meteorology 3. Philosophy.** —*M.R.*

REVIEW ARTICLES AND MONOGRAPHS

6.8–8 551.577.37/8(54)

*Govindaswamy, T. S., **Rainfall abnormalities, week by week, in India during 1908 to 1950.** *Irrigation and Power*, 10(2/3), 128–129, 207–244, April/July **1953.** 34 figs., 30 tables, 2 refs. **DWB**—The rainfall regime (and variability) in 30 districts of India and Pakistan, is shown vividly and in great detail by a series of tables which are so arranged that by drawing isohyets or by hatching they become charts. First the normal monthly rainfall in each of the 30 districts for 1875–1944 is shown with isolines for 1, 2, 5, 10, 15 and 20″ per month, and the same for variability of 50, 100, 200, 300 and 500%. Then a series of charts are given (one for each region), showing for the entire year (for each year 1908–1950) the period of floods (>200%), normal (50 to 200%) and drought (<50%) based on normal weekly rainfall. A table for each district shows the frequency of floods and drought of 1 to 14 weeks duration, respectively. The peculiarities of each section with respect to drought, flood variability and monsoon conditions, irrigation needs, etc. are described in text. *Subject Headings:* **1. Rainfall anomalies 2. Drought frequency data 3. Flood frequency data 4. Rainfall variability 5. India.**—*M.R.*

6.8–9 551.506.1(46)

*Spain. Servicio Meteorológico Nacional, **Resumen de observaciones meteorológicas,** [Summary of meteorological observations] **1901–** Latest issue seen, 1947, pub. **1954.** 1947 issue, 1200 p. of tables. ccv p. of introductory material and description of stations. Annual. v. 1–20, numbered. Prior to 1901, similar data issued by the Central Meteorological Observatory at Madrid. **DWB**—This yearbook consists of a voluminous compilation of all available data from 2235 meteorological stations in Spain for 1947. Pressure, wind, rain, evaporation, cloudiness, visibility and miscellaneous phenomena for 110 first order stations, temperature, rainfall and wind data for 477 thermopluviometric stations, and rainfall data for 1648 rainfall stations are presented in the form of tables of monthly mean or frequency data (for thrice daily observations in the case of the first order stations). Station location, tables and charts give information about each station. Arrangement is by regions and alphabetically for the entire country. *Subject Headings:* **1. Annual meteorological summaries 2. Annual rainfall summaries 3. Spain.**—*M.R.*

6.8–10 551.557:551.513.2

†Faust, H., **Übergradientische Winde in der Nullschicht und das Problem der Strahlströme.** [Super-gradient winds in the zero layer and the problem of the jet stream.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 8(1/2):45–71, **1955.** 10 figs., 30 refs. German, English and French summaries p. 45–46. **DWB**—The flow of air from low to high pressure in the "zero layer" (Nullschicht) can be deduced from the interdiurnal temperature variations. This is confirmed by a study of all confirmed departures of winds from 225 mb isohypse direction in Europe 1952–53, showing a maximum flow towards high pressure at that level. This implies supergradient winds in the zero layer which is thus the seat of the jet stream. Scatter diagrams and profiles show that winds at 225 mb are nearly all supergradient when jet stream is present, but not when it is absent. The jet stream results from the zero layer effect, being proportional to the gradient, combined with convergence and divergence. The "indirect thermal circulation" (sinking warm air or rising cold air) in the jet stream region is confirmed. A good deal of jet stream literature is referred to in this important paper. *Subject Headings:* **1. Jet stream 2. Zero layer.**—*C.E.P.B.*

6.8–11 551.583.3

†Gerasimov, I. P. and Markov, K. K., **Lednikovyĭ period na territorii SSSR. Fizikogeograficheskie usloviia lednikovogo perioda.** [The glacial period in the territory of the U.S.S.R.

Physico-geographical conditions of the glacial period.] *Akademiia Nauk SSSR, Institut Geografii, Trudy*, 33, **1939.** 462 p. 196 figs. (incl. photos, diagr. maps—some fold.), 12+ tables, numerous refs. at the end of each chapter. Russian and English summaries p. 438–462. **DLC**—In this comprehensive and highly technical book on glaciation and glacial periods in European and Asiatic U.S.S.R., all of the evidence (glacial, geomorphological, pedological, limnological, botanical (pollen, peat, forest succession and fossil) and zoological) of glaciation or non-glaciation during and since the Pliocene, down to contemporary mountain glaciation, drying up of lakes in Central Asia and warming of Arctic, is brought to bear on the problem of continental (sheet) and mountain glaciation and the effects thereof. The authors hold to the theory that sheet glaciation was metachronous, not synchronous, both in Eurasia and America. In other words, conditions favorable to glaciation in the western regions (low winter and summer temperatures and a strong Siberian or Continental anticyclone) would be unfavorable to glaciation in the eastern part of the continent. Then there are the long interglacial periods when no glaciation occurred except in high mountain areas. The climatic conditions giving rise to glaciation in each period or epoch, including the contemporary one, and in each region, are thoroughly discussed. Contemporary frozen ground and glaciation in Scandinavia, European U.S.S.R., Central Asia and Siberia are treated at length. The synoptic circulation patterns and other factors influencing climatic changes which produce glaciers in mountains (as in Pliocene), in plains, interglacial periods and climatic optima are also thoroughly treated. The greatest effect of Quaternary glaciation in U.S.S.R. was said to be the building up of the extensive loess deposits of Central Russia. The interglacial periods were thought to be warm and moist in contrast to contemporary hot dry epoch in Caspian region. *Subject Headings:* **1. Quaternary climates 2. Climatic changes 3. Glaciation in U.S.S.R. 4. U.S.S.R.**—*M.R.*

6.8–12 551.58:6

†Grundke, Günter, **Die Bedeutung des Klimas für den industriellen Standort. Eine Studie auf dem Gebiete der Technischen Geographie.** [The importance of climate for industrial location. A study in technical geography.] *Petermanns Geographische Mitteilungen, Erganzungsheft*, No. 255, **1955.** 127 p. 22 figs., 30 tables, 256 refs. **DLC**—This work begins by reviewing the present state of knowledge of industrial climatology and the effect of climate on industrial processes. In Pt. 3 the optimum climate is set out for work of different types—first the different branches of the textile industry, then the food and tobacco industries, paper making etc., chemical and cosmetic industry, films, etc. Pt. 4 deals briefly with the climate of the town, of enclosed spaces and rooms. Pt. 5—with the artificial regulation of climate from the point of view both of the product and of the health of the worker; the former is elaborated in Pt. 6. Pt. 7 deals with the actual climates in which the various industries operate, and what can be done to improve them; this is followed by a useful tabular statement of climatic and other factors in industry. Pt. 8 takes the form of a general treatise on industrial climatology. A number of "case histories" complete this valuable book. *Subject Heading:* **1. Industrial climatology.**—*C.E.P.B.*

6.8–13 551.575

*Johansson, Oscar Vilhelm, **Dimman i Norden.** [Fog in the North.] *Finska Vetenskaps-Societeten, Bidrag till Kännedom af Finlands Natur och Folk*, 88(6), **1945.** 144 p. 3 figs., 44 tables, refs. **DLC**—The occurrence of fog in Finland, Sweden and Norway is analyzed. The following aspects are considered: annual frequency of fog in Finland, its characteristics, variation of annual frequency, annual frequency in Sweden and in Norway, the seasonal variation of various types of fog in Northern Europe, variation of fog with elevation in Norway, daily variation of fog duration and relationship to wind rose. The data are presented in numerous tables. *Subject Headings:* **1. Fog data 2. Fog frequencies 3. Fog variations 4. Finland 5. Norway 6. Sweden.**—*I.L.D.*

6.8–14 551.578.46

*†Rikhter, Gavril Dmitrievich, **Snow cover, its formation and properties.** Translated by William Mandel from the original Russian article entitled: **Snezhnyĭ pokrov, ego formirovanie i svoĭstva.** Izdat. Akademiia Nauk SSSR, Moscow, 1945. Rev. ed. of 1950 translation.

U. S. Snow, Ice and Permafrost Research Establishment, Translation, No. 6, Aug. 1954. 66 p. 42 tables, 21 diagrs., 100 refs. **MH-BH**—This compact monograph on the formations and characteristics of snow cover is designed for the use of military engineers of the Red Army. It covers the following aspects: the physics and mechanics of snow cover formations; the density of snow, classification of snow, deposition of snow (drift, accumulation and methods of preventing snow accumulation); the principal physical characteristics and various effects of snow cover; weathering due to snow etc.; thawing of snow, flow of snow waters and their effects; and, finally, the distribution and properties of snow cover in the Soviet Union. Data on the properties of snow and snow cover, maps showing for the U.S.S.R. dates of first and last snow cover, duration and average depth of snow cover are given. A very full bibliography is included. (For abstract of original work, *see item* 2–151, Feb. 1950, *MAB*.) *Subject Headings:* **1. Snow cover 2. Snow mechanics 3. Snow physics 4. Snow bibliographies 5. U.S.S.R. I. Mandel, William** (*trans.*).—*I.L.D.*

6.8–15 551.582.2(43)

*Van Eimern, Josef and Kaps, Egon, **Lokalklimatische Untersuchungen im Raum der Harburger Berge und der benachbarten Elbniederung.** [Local climatic investigation in the Harburg Hills and the adjoining Elbe lowland.] Münster, Westphalia, Landwirtschaftsverlag GmbH., **1954.** 111 p. 25 figs., 26 tables, 21 refs. At head of t-p: **Landwirtschaft-Angewandte Wissenschaft. DWB**—This detailed study of the local climate of Harburg Hills and the neighboring Elbe lowland, an area of about 100 sq mi, is based upon meteorological observations made at 5 stations during Dec. 1, 1951–Aug. 31, 1952. It is a model study of its kind, containing detailed data presented in tables and graphs. The contents are as follows: a geographic description of the area and a description of the weather stations and of their instrumentation, etc.; an account of the weather for ground surface, etc.; frequency of hourly relative humidity at 5% intervals, hourly values of relative humidity, monthly mean of daily maximum, minimum and of daily variation of relative humidity; soil temperature; precipitation, including relationship of precipitation to wind direction, mean number of days with precipitation $\geq$0.1 mm, $\geq$1.0 mm, $\geq$10 mm and mean annual rain density for 1938–1951; distribution of snow for the period Dec. 1, 1951–Aug. 31, 1952; mean and rank values for air temperature and relative humidity including daily and monthly mean hourly means, number of days with mean temperature below 0°C and number of hours with a temperature below 0°C, frequency of hourly temperature in 5° intervals, extreme temperature values, dependence of minimum temperature upon cloudiness and upon wind direction and intensity, monthly means at height, and mean daily sunshine duration in hours (1891–1930) and mean daily sunshine duration for 1952 in hours. *Subject Headings:* **1. Observational data 2. Climatic data 3. Climatic of the Harburg Hills 4. Harburg Hills, Germany.**—*I.L.D.*

6.8–16 551.573:551.481(08)

*U. S. Navy Electronics Laboratory, **Water-loss investigations, vol. 2, Lake Hefner studies base data report.** *U. S. Geological Survey, Professional Paper*, No. 270, **1954.** 300 p. almost entirely tables. Also issued as: *U. S. Navy Electronics Laboratory, N.E.L. Report*, No. 328. **DWB**—Vol. I of these two excellent reports gave results of studies made at Lake Hefner. Vol. II gives the basic data which were analyzed in Vol. I (*see* 5.3–13, March 1954, *MAB*), namely: water budget, mass-transfer energy budget and pan-evaporation data. Wet and dry bulb temperatures, wind speeds at 4 levels, and water surface temperatures are given for each of 4 meteorological stations. Evaporation was calculated for each 3-hourly period and total for 8, 3-hourly periods in a day used for computing daily evaporation; solar reflection and atmospheric radiation data also given. For most elements the period of record was April 1950–Aug. 1951. Not all of the data are published—only pertinent or summarized data. *Subject Headings:* **1. Evaporation from lakes 2. Water budget 3. Lake Hefner, Okla. I. U. S. Geological Survey II. U. S. Weather Bureau III. Kohler, Max A.**—*M.R.*

6.8–17 551.551:533.15

*†Saha, K. R. (*I.A.F. Wing, Ambala*), **Atmospheric turbulence and diffusion, Pt. 1.** *Indian Journal of Meteorology and Geophysics*, Delhi, 5(3):205–218, July **1954.** 3 figs., 2 tables, 70 figs., 54 eqs. **Pt. 2,** *Ibid.*, 5(4):208–314, Oct. **1954.** 4 figs., 14 refs., eqs. (55–77). **DLC**—

First part is a most thorough and orderly review of the theory and many applications of turbulence theory to problems of diffusion in the atmosphere. Turbulence, the boundary layer and basic hydrodynamic equations are defined. Transfer of heat, momentum and matter by eddies (mixing length, wind variation with height, shearing stress, Richardson's criterion, decay of turbulence); statistical theory of turbulence applied to diffusion (clouds, line sources, point sources); evaporation and eddy diffusion of water vapor; advection of air masses over sea; isotropic turbulence, Kolmogorov's similarity hypothesis and experimental tests thereof; Weizsäcker-Heisenberg theory of turbulent energy transfer, etc. are treated with many examples and data. Second part discusses recent developments in theory of isotropic motion and experimental tests of Kolmogorov's similarity hypothesis and its applications to the atmosphere. *Subject Headings:* **1. Turbulence 2. Turbulent diffusion 3. Review articles.** —*M.R.*

GENERAL GEOPHYSICS AND METEOROLOGY

GENERAL GEOPHYSICS, ASTROPHYSICS, ETC.

See also: **Intern. Research Program** (Schumann), 6.8–115; **Ablation and heat balance** (Hoinkes), 6.8–228; **Effect of winds on length of day** (Minz, and Munk), 6.8–261.

6.8–18 551.511:523.74:538.1

†Alfvén, H. (*Roy. Inst. of Tech., Stockholm*), **Magneto-hydrodynamic waves in the sun** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:415–425, July **1954.** 38 refs., 3 eqs. Discussion p. 421–423. **MH-BH**—In the presence of a magnetic field, a fluid having a sufficiently high electric conductivity is able to transmit magneto-hydrodynamic waves. In the sun, the general magnetic field and the high degree of ionization found there provide conditions favorable for the existence of such waves. Magneto-hydrodynamic effects have been investigated in the laboratory, using mercury and a magnetic field of 10,000 to 15,000 gauss. The mercury, in the presence of the magnetic field, behaves as though it possessed a high anisotropic "electromagnetic viscosity." Since all motions of the conducting liquid cause electric currents, the properties of mercury change remarkably. Magneto-hydrodynamic waves may be of great importance in explaining: 1) origin of sunspots, 2) propagation of the sunspot magnetic field outward to the solar surface, 3) phenomena of magnetically variable stars and 4) granulation in the solar photosphere. *Subject Headings:* **1. Magneto-hydrodynamic waves 2. Sunspots 3. Electromagnetism 4. Solar physics.**—*From author's abstract.*

6.8–19 523.78

Shcherbina-Samoĭlova, I. S., **Solnechnoe zatmenie 30 iiunia 1954 goda.** [Solar eclipse June 30, 1954.] *Priroda*, Moscow, 5:85–87, May **1954.** map, ref. **DLC**—The path of the solar eclipse is described and is shown on a map. Some of the scientific problems of astrophysics and solar physics, in particular, which a study of eclipses can solve, some of the methods of investigating them and the results of this eclipse in the U.S.S.R. are discussed briefly. *Subject Headings:* **1. Solar eclipses 2. U.S.S.R.**—*I.L.D.*

6.8–20 621.396.8:532.7:551.594.5

Hartz, T. R., **A solar noise outburst of January 15, 1955.** *Nature*, London, 175(4464): 908–909, May 21, **1955. DWB**—A large noise outburst from the sun was recorded on 50 Mc/s at Ottawa on Jan. 15, 1955. It was followed by an intense ionospheric storm and an intense auroral display on Jan. 17–18. *Subject Heading:* **1. Solar radio noise.**—*C.E.P.B.*

6.8–21 525.3:551.583.7

Gold, T., **Instability of the earth's axis of rotation.** *Nature*, London, 175(4456):526–529, March 26, **1955.** 9 refs. **DWB**—Movement of axis by about $\frac{1}{4}$ sec in 12 months is attributed to atmospheric effects; that in 14 months corresponds with Eulerian nutation. Other movements are attributed to deformation of the solid earth by plastic flow, which dictates the speed

of polar wandering. A small disturbance can slowly produce a large effect on the position of the pole. The main redistribution of mass at present is by glaciation and deglaciation of continents. In the past 50 years melting of Greenland ice has swung axis towards Newfoundland by about 1 sec. There may have been a few occasions in geological history when pole has moved rapidly for periods of 10^6–10^6 years followed by long stable periods. This may account for the glaciation of present tropics. *Subject Headings:* **1. Polar displacement 2. Geological climates.**—*C.E.P.B.*

6.8–22 551.573:551.311.12:525.3

Korff, Serge A. (*N. Y. Univ.*), **Effect of the melting of polar ice on the length of the day.** *Physical Review*, 95(1):296–297, July 1, **1954.** 2 refs., 3 eqs. **DWB**—Theoretical calculations show that if all of the ice on the Greenland Ice Cap melted, the earth would slow down 100 sec/year, and a similar change would accompany melting of Antarctic ice. Since there is an annual cycle in the Arctic which is out of phase with that in the Antarctic, there will be a 6-month periodicity in changes of length of day, with a long-term or progressive change of perhaps one sec/year, due to gradual melting of only .1–.2% of all the earth's ice. A 10 cm ablation of Greenland ice would slow down the earth's rotation by 26 microsec/day (assuming 1000 cu km of ice melting). *Subject Headings:* **1. Rotation of the earth 2. Polar ice melting effects 3. Glacial ablation.**—*M.R.*

6.8–23 551.593.1:526.5

de Graaf-Hunter, J., **Various determinations over a century of the height of Mount Everest.** *Geographical Journal*, 121(1):21–26, March **1955.** 16 refs. **DWB**—An account of the corrections for refraction in calculating the height of Mt. Everest. After allowing for distortion of the geoid, the figure obtained is 29,032 ft above the geoid. *Subject Headings:* **1. Atmospheric refraction 2. Surveying 3. Mount Everest.**—*C.E.P.B.*

6.8–24 536.2:551.583

*Birch, Francis, **Thermal conductivity, climatic variation, and heat flow near Calumet, Michigan.** *American Journal of Science*, New Haven, Conn., 252(1):1–25, Jan. **1954.** 5 figs., 10 tables, refs. p. 24–25. **DWB**—Measurements of thermal conductivity are reported for some 90 samples of rock from the vicinity of Calumet, Michigan. Mean values, in millicalories (per cm sec deg), are as follows: Jacobsville sandstone, 6.78 ± 0.71; Freda sandstone, 6.81 ± 024; Copper Harbor conglomerate, 4.98 ± 0.25; and Portage Lake lava series, 5.01 ± 0.11. Some evidence is found for a correlation between conductivity and degree of alteration in the basic lavas. These measurements, and the older determinations of temperature in mines and borings of the region, are discussed with relation to the problem of geothermal evidence for climatic variations during and since the Pleistocene, and to the heat flow. It is concluded that no thermal effect definitely related to climatic change can be discovered with the available data. The local rate of heat conduction to the surface is 0.93 microcalorie (per cm^2 sec), with an estimated uncertainty from all causes of about 10%. *Subject Headings:* **1. Thermal conductivity 2. Climatic changes 3. Calumet, Mich.**—*Author's abstract.*

6.8–25 550.37

Huber, A., **Der scheinbare spezifische Widerstand einer geneigten ebenen Schichte.** [The apparent specific resistance of an inclined plane surface.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 8(1/2):95–112, **1955.** 9 figs., 8 refs., eqs. German, English and French summaries p. 95–96. **DWB**—Starting from the rigorous representation of the electrical potential for a wedge, the apparent specific resistance is derived for both a parallel and a normal direction of the measuring basis, with regard to the outcrop of an even inclined stratum boundary. Comparison of the resistance curves with the normal two-layer curves indicates possible errors in evaluating geoelectric soundings. Furthermore, it is shown how the apparent specific resistance varies when an outcrop is being crossed with a horizontal sonde and how the direction of a stratum boundary can be determined by radial sounding. Finally, the theoretical bases for investigation of the influence on slopes on geoelectric soundings are developed. *Subject Heading:* **1. Geoelectricity.**—*Author's abstract.*

6.8–26 550.385

Rush, J. H., **A semi-annual periodicity in the beginnings of recurrent magnetic storm series.** *Nature*, London, 175(4455):517–518, March 19, **1955.** fig., ref. **DWB**—A strong tendency is noted for the initial disturbance of a 27-day recurrent series to occur near Jan. or July. *Subject Heading:* **1. Magnetic disturbances.**—*C.E.P.B.*

6.8–27 550.385

Nagata, T. (*Tokyo Univ., Geoph. Inst.*), **An intuitive description of the Chapman-Ferraro theory of the initial phase of a magnetic storm.** *Journal of Geophysical Research*, 59(4): 467–470, Dec. **1954.** 7 refs., 15 eqs. **MH-BH**—The Chapman-Ferraro theory of the initial phase of a magnetic storm is reviewed in a simple intuitive form, by considering the macroscopic dynamical character of a moving ionized stream in a magnetic field. Fundamental equations thus obtained are (a) $H_s^2/8\pi = nm_+(w_\infty - w_0)^2$, (b) $H_s = 2H_p$, and (c) $H_p = H_0/Z^3$. The second can be replaced by (b)′, $H_s = (3/2)H_p$, in the case of FERRARO's model of one-dimensional distribution of a permanent magnetic field. These results are in exact agreement with the final results obtained by CHAPMAN and FERRARO, and recently by FERRARO. *Subject Headings:* **1. Chapman-Ferraro theory of magnetic storms 2. Magnetic storm theory.**—*Author's abstract.*

6.8–28 550.384.4

Thiruvengadathan, A. (*Solar Physics Obs., Kodaikanal*), **Diurnal variation of horizontal magnetic force at Kodaikanal.** *Indian Journal of Meteorology and Geophysics*, Delhi, 5(3): 267–271, July **1954.** fig., 3 tables, 4 refs., 3 eqs. **MH-BH**—The diurnal variation of horizontal force at Kodaikanal, on each of the international quiet days during the summer solstices of the years 1949–1951, is subjected to harmonic analysis. The harmonic coefficients of the same period are plotted on a harmonic dial. In the case of a strictly persistent periodicity, affected only by random errors, the probable error figure will be a circle. For the 24-hourly wave the probable error figure is found to be an ellipse having the ratio of the axes, 1.80. The direction of the major axis indicates that the amplitude varies much more than the phase. An attempt is made to find out whether this large variation in amplitude can be accounted for by regular causes like degree of disturbance; variation of sunspot variability is mostly fortuitous. It is also noticed that as the value of the first harmonic coefficient decreases, the corresponding decrease in the second harmonic coefficient is less and the second component may even be larger than the first when the latter is very small. *Subject Headings:* **1. Diurnal magnetic variations 2. Harmonic analysis.**—*Author's abstract.*

INTERNATIONAL GEOPHYSICAL YEAR, EXPEDITIONS, NETWORKS AND OBSERVATORIES

See also: **Gt. Brit. Inst. of Oceanogr.** (Deacon), 6.8–61.

6.8–29 551.5 91.04(99)

U. S. Congress. Senate. Committee on Armed Services, **Antarctic expedition. Hearing before the Committee . . . 83rd Congress, 2nd session, on S.3381, a bill to authorize the President to provide assistance to an expedition to the Antarctic in furtherance of the interest of the U. S.** Wash., D. C., U. S. Govt. Print. Off. **1954.** 27 p. maps (1 fold.). **DLC**—Gives arguments in favor of proposed 1955–58 Antarctic Expedition by FINN RONNE, specifications and plans for expedition, maps of Antarctic showing "sphere of influence" or claims and size relative to that of U.S.A. (50% bigger) and remarks of various sponsoring congressmen or senators. Personnel should include 2 meteorologists and 2 assistants from U. S. Weather Bureau and all necessary meteorological equipment. Meteorological, geological and cartographical work considered paramount. Stations can be later occupied by I.G.Y. personnel without interruption. *Subject Headings:* **1. Antarctic expedition appropriations 2. International Geophysical Year expeditions 3. Antarctica.**—*M.R.*

6.8–30 55.03:06(09) 551.506.5(98/99)

Van Mieghem, J., **International Geophysical Year, 1957–58, Pt. 1, Historical survey.** *World Meteorological Organization, WMO Bulletin*, 4(1):6–9, Jan. **1955. Pt. 2, The programme.**

Ibid., 4(2):52–59, April **1955.** photo. **DWB**—The first paper trea tshistory of the first and second International Polar Years, proposals for Third Polar Year, 1957–58 by L. V. BERKNER, and its approval by ICSU, IUSR, IAU, IUGG, and collaboration by WMO with IATME and IAM. The WMO, in Executive Committee (1951), agreed to participate but suggested making it a Geophysical Year, since less is known about tropical and some mountain or ocean areas than about polar regions. Establishment of CSAGI and subsequent activities, especially the scope of the meteorological program, are reviewed. Finally the actions taken at the Rome meeting of CSAGI—Oct. 1954, are mentioned. In the second paper the various fields of geophysics which will be subjected to intensive study during International Geophysical Year are discussed from the point of view of problems to be solved or program outlined: 1) terrestrial magnetism, 2) aurora and airglow, 3) ionospheric physics, 4) latitude and longitude, 5) solar activity, 6) cosmic rays, 7) glaciology and climatic change, 8) oceanography, and 9) meteorology. World days rocket soundings, publications and geographical distribution of network are covered in the final paragraphs. *Subject Headings:* **1. International Geophysical Year, 1957–58 2. History of Polar Year 3. International Polar Year, 1882–1883 4. International Polar Year, 1932–1933.**—*M.R.*

6.8–31 55

Commission Mixte pour l'Étude des Relations entre les Phénomènes Solaires et Terrestres. Rome, 3 septembre 1952. [Mixed Commission for the Study of the Relations between Solar and Terrestrial Phenomena.] *International Union of Geodesy and Geophysics, Bulletin d'Information*, 2(2):383–385, April **1953. DWB**—Publications are mentioned and interest in the International Geophysical Year, 1957–58 is indicated. *Subject Heading:* **1. International Geophysical Year, 1957–58.**—*M.R.*

6.8–32 551.506.5:551.465(268)

The Soviet high latitude Arctic air expedition and drifting stations in the Arctic Ocean, 1954. *Polar Record*, 7(50):396–399, May **1955.** fig., 2 photos, refs. Also: **Soviet reports of "ice islands" in the Arctic Ocean.** *Ibid.*, 416–417. **DLC**—Stations were established in April, 1954 on floes in 86°N, 175°45′W and 75°48′N, 175°25′W in association with aircraft flights. Drifts and depth soundings are shown. Weather observations showed an influx of warm air from the Pacific, 7000–9000 ft thick with its lower limit only 200 m above surface. The second report describes Soviet sightings of ice islands. *Subject Headings:* **1. Ice drift 2. Arctic drift expeditions 3. Floating ice islands 4. Arctic.**—*C.E.P.B.*

6.8–33 551.5(268) 91.04(268)

Täubert, H. (*trans.*), **Über neue sowjetische Forschungen und Entdeckungen in der Zentralarktis.** [On new Soviet investigations and discoveries in the central Arctic.] *Petermanns Geographische Mitteilungen*, 99(1):70–77, **1955.** 2 charts, 9 figs. **DLC**—An account is given of the Russian explorations of the Arctic, especially since the war by drifting ice stations. The first part deals with sea-floor relief and the vertical distribution of deep sea temperature. The discovery of a layer of warm water at a depth of 400–500 m is an important feature. The distribution of floating ice and its movements are discussed in detail, a distinction being drawn between the old thick ice of the Canadian Archipelago and the Beaufort Sea and the thinner ice of the Kara and Laptev Sea which finds a way out into the North Atlantic. Pt. 3 deals with the meteorological conditions, cyclonic activity, air masses and radiation balance. Pt. 4 describes results of the investigations of geomagnetism, including a new map of horizontal force and isochrones of the onset of magnetic storms. The advance in recent years is shown by maps of the state of knowledge of the sea floor in 1948 and 1954. *Subject Headings:* **1. Expeditions 2. Arctic Ocean.**—*C.E.P.B.*

6.8–34 551.508.29:551.524.4:551.551 551.506.9:551.584

Stewart, Robert M., Jr., **Description of the Iowa State College equipment used in the Great Plains field test and a descriptive analysis of some of the data obtained.** Iowa. State College of Agriculture. Dept. of Physics, Contract AF 19(122)-440, Scientific Report, No. 4, June 15, **1954.** 34 p. 26 figs., 20 refs., eqs. Also his: **Presentation of data obtained at the Great Plains field test, O'Neill, Nebraska, Aug.–Sept. 1953.** *Ibid.*, Scientific Report, No. 5, July 1, **1954.** unpaged. almost entirely tables. **MH-BH**—In the first paper a method is

presented for detecting, recording and analyzing automatically turbulent temperature fluctuations in the atmosphere. A detailed technical discussion, accompanied by photographs and diagrams is given of the instrumentation, which is subdivided into sensors, consisting of the temperature transducer (thermistor) and anemometer, the temperature recorder, the playback equipment and the tabulator. The experimental techniques used to obtain the data at the Great Plains field test at O'Neill, Nebraska are described. The application of the statistical measures, namely standard deviation and the PEARSON product-moment correlation coefficient between adjacent thermistor levels to devise a stability parameter is outlined. It is shown that the intensity of thermal turbulence depends upon atmospheric instability and is greater during periods of instability than during periods of stability. The intensity of thermal turbulence decreases with heights during periods of instability and increases with height during periods of stability. "The vertical scale of thermal turbulence increases with decreasing stability," and "the rate at which it increases with height is greater during periods of instability than during periods of stability." The temperature and wind velocity data that are analyzed in the second report were obtained with Western Electric Head thermistors type D-176980 and cup response anemometers. Wind and temperature were measured simultaneously every two hours. The temperature data were analyzed to give standard deviation of the temperature fluctuations at each of the six levels, from 25 to 800 cm, and the correlation coefficient of the temperature fluctuations between adjacent levels. The wind records have been reduced to average velocities for the heights (100, 400 and 700 cm) and the period observed. *Subject Headings:* **1. Turbulent temperature fluctuations 2. Turbulence instrumentation 3. Instability 4. Temperature data 5. Wind data 6. Thermistors 7. Cup anemometers 8. Micrometeorology 9. O'Neil, Nebraska.**—*I.L.D.*

6.8–35 551.508.29:551.524:551.551

Kassander, A. Richard, Jr.; Stewart, Robert M., Jr.; McDonald, James E. and Doyle, Barrett, **Investigations of turbulent temperature fluctuations in the lower atmosphere.** Iowa. State College. Physics Dept., Contract AF 19(122)-440, Final Report, July 15, **1954.** 8 p. **MH-BH**—In this final report the authors summarize the previous, published reports of this contract. A brief account is given of the development of the tape recording system, of the 100-counter tabulator system, of the thermometers, which consisted of bead thermistors, and of their lag-time, of the specially developed three-cup type anemometer and of the field observations, namely the Great Plains Test at O'Neill, Nebraska held in Aug.–Sept. 1953. *Subject Headings:* **1. Turbulent temperature fluctuations 2. Thermistors 3. Thermometer lag 4. Cup anemometers 5. O'Neill, Nebraska.**—*I.L.D.*

6.8–36 551.501.9(98)

Canada. Meteorological Division (and) U. S. Weather Bureau, **Joint Canadian-United States Arctic Weather Station Programme. A review of the establishment and operation of the Joint Arctic Weather Stations at Eureka, Resolute, Isachsen, Mould Bay, and Alert, and a summary of the scientific activities at these stations, 1946–1951.** [n.d.] 147 p. tables, graphs. **DWB**—This report contains the history of the development of weather stations in the Canadian Arctic before World War II and of the joint U. S.-Canadian Arctic Weather Project, the establishment of the weather stations including a description of the sites, the various aspects of station maintenance such as fire protection, waste disposal, storage of food and fuel, operation of mechanical equipment, the methods of resupply, personnel set up, the meteorological programs for surface and upper air observations, a description of the special scientific projects undertaken by the weather station personnel, an account of the Resolute Magnetic Observatory, problems encountered in installing Arctic buildings, the kinds of scientific investigations carried out by transient scientific personnel and the radio communications established for the Joint Arctic Project. *Subject Headings:* **1. Arctic weather stations 2. United States-Canadian Arctic Weather Project 3. History of meteorological services 4. United States 5. Canada.**—*I.L.D.*

6.8–37 537.5:551.521.64 550.3

Korff, Serge A., **Physics south of the Sahara.** *Physics Today*, 8(3):10–11, March **1955. DLC**—Current research in physics and geophysics and potentials for future research in Central,

Eastern and Southern Africa are reviewed. Leading institute is Bernard Price Institute of Geophysics at Witwatersrand Univ., Johannesburg, established under "aegis" of B. F. G. SCHONLAND, now Deputy Director of atomic research in England. Research on lightning inside clouds is carried on by means of radar. At Kampala, Uganda (3800 ft elevation), on N. shore of Lake Victoria, the Univ. College of East Africa has initiated a Cosmic Ray Program under D. M. THOMPSON, formerly of Cambridge and Princeton. Astrophysical work is carried on at Johannesburg, Pretoria and Bloemfontein (all at 4900–5900 ft elevation). Mountains from 10,000–19,500 ft provide potential cosmic ray and astrophysical observatory sites for high altitude work. *Subject Headings:* **1. Cosmic radiation research 2. Lightning research 3. Geophysics research 4. South Africa. I. Schonland, B. F. J. II. Thompson, D. M.**—*M.R.*

6.8–38 551.5(016)

†Vandenplas, A., **L'activité météorologique en Belgique de 1951 à 1953.** [Meteorological activity in Belgium, 1951–1953.] *Ciel et Terre*, 70:(3/4):91–102, March/April **1954.** bibliog. p. 98–102. **DLC**—A review of the meteorological research carried out in Belgium during the 3-year period of 1951–1953 is presented together with a bibliography grouped according to the following subdivisions: general meteorology; general climatology; local climatology, including the Belgian Congo; agricultural climatology, also including the Belgian Congo; radiation; aerology; atmospheric thermodynamics; atmospheric dynamics and history of meteorology. *Subject Headings:* **1. Meteorological research 2. Meteorology bibliographies 3. Belgium.** —*I.L.D.*

6.8–39 523.78

Redman, R. O., **Total solar eclipse of June 30. British expeditions' results.** *Nature*, London, 174(4423):247–249, Aug. 7, **1954.** Also: Waldmeier, M., **Sonnenfinsternis 1954. Bericht über die Expedition der Eidgenossischen Sternwarte Zurich.** [Solar eclipse 1954. Report on the expedition of the Federal Observatory at Zurich.] *Umschau*, 54(17):527–530, Sept. 1, **1954.** 8 figs. **DLC**—First article is a brief account of work of various British parties in Sweden and in aircraft. Except at Öland, where thick cloud was met, moderate success was obtained. In the second article a full description is given of the instrumental set-up for study of the corona during Swiss expedition to Sweden, with photographs of the inner and outer corona and polar rays. A graphic description of the progress of the eclipse is given. *Subject Headings:* **1. Solar eclipses 2. Sweden.**—*C.E.P.B.*

6.8–40 551.501.9(694/8)

King, J. A., **Another island weather station.** *South Africa. Weather Bureau, News Letter*, No. 63–7–8, June **1954.** fig. **DWB**—A note, accompanied by a sketch map, dealing with the establishment of a weather and radio station on Tromelin Island 15°53′S, 54°29′E, about 300 mi from the east coast of Madagascar. *Subject Headings:* **1. Meteorological stations 2. Tromelin Island.**—*I.L.D.*

CONGRESSES, CONVENTIONS AND ORGANIZATIONS AND INSTITUTIONS

See also: **Nat'l. Inst. of Oceanogr.** (Deacon), 6.8–61.

6.8–41 551.5:06

New York University. College of Engineering. Research Div., **Annual Report, 1951.** Issued by the Univ. 23 p. photos. **DWB**—Research activities, which had greatly expanded during the year July 1, 1950 to June 30, 1951 are described and illustrated. Among those are many of meteorological nature such as storm wave forecasting, wind tunnel, air pollution, cosmic ray, atmospheric heat balance, atmospheric oscillations, upper air wind variability, high level wind (20–50 km) patterns, constant level balloons, dew point, hygrometers, ozonesonde, aneroid capsules, heat pump, turbulence and soil permeability. A number of these activities are nicely illustrated by photographs of laboratory equipment in operation. *Subject Headings:* **1. Meteorological research projects 2. New York University.** —*M.R.*

6.8–42 550.3:06

Wilson, William S., **Geophysical Institute at the University of Alaska.** *Alaska. Univ. Geophysical Institute, Contributions, Ser. A*, No. 1, [1951]. 5 figs. Reprinted from *Alaskan Science Conference, Wash., D. C. Nov. 1950, Selected Papers*, p. 170–196. Also his: **On activities of the Geophysical Institute.** *Alaskan Science Conference, 2nd, Mt. McKinley National Park, Sept. 4–8, 1951, Proceedings*, p. 298–302, [1953?]. **DWB**—In his first work author includes 1) a brief history of the Univ. of Alaska, 2) a general review of early research in Arctic Geophysics at the Univ., 3) the history of the procedures and legislation authorizing the establishment of the Geophysical Institute at the Univ., 4) a description of the facilities provided and a statement of provisions for operating the Institute, 5) a brief review of research in geophysics and 6) a proposal for the future role of the Geophysical Institute in Alaskan research. Among the types of research being carried on are: ionospheric measurements, radio signal intensity measurement, auroral height determination, measurement of intensity of the light of the night sky and investigation of the state of the atmosphere in the Arctic. A photograph and floor plans of the Geophysical Institute building are included. In his second article work of laboratories at Univ. of Alaska (College, Alaska) in ionospheric, oceanographic, seismological, auroral, cosmic radiation and ozone, optical sounding, etc., research both past and projected are outlined. Personnel problems are discussed. *Subject Headings:* **1. Alaska. Univ. Geophysical Institute 2. Geophysics research 3. College, Alaska.** —*M.L.R., M.R.*

6.8–43 551.5(09)

Reichelderfer, F. W., **Beyond the Second Congress.** *World Meteorological Organization, WMO Bulletin*, 4(1):2–5, Jan. **1955. DWB**—Recent developments in meteorology, inadequacy of present facilities, work of the WMO since the First Congress, future program of WMO in hydrology, the International Geophysical Year and in regional and technical work for international coordination and advancement of meteorology (rather than in operational activities) are discussed in the light of the past 3 years experience of the officers and staff of the Secretariat of the WMO. *Subject Headings:* **1. Progress in international meteorology 2. World Meteorological Organization.**—*M.R.*

6.8–44 551.5:016:06

van der Linde, E., **First Session of the Commission for Bibliography and Publications.** *World Meteorological Organization, WMO Bulletin*, 3(2):52–56, April **1954. MH-BH**—First Session met Nov. 24–Dec. 14, 1953 at Paris under the presidency of MAURICE MEZIN of Météorologie Nationale, Paris. Only 9 members were present, so no final action could be taken by the Commission. Discussion of the world meteorological bibliography, revision of U.D.C. section 551.5, meteorological lexicon and polyglot vocabulary, guide to meteorological library practice, exchange of documents and other questions resulted in a set of draft proposals which would be voted on by members in a mail ballot. *Subject Headings:* **1. WMO. Commission for Bibliography and Publications 2. World Meteorological Organization 3. Paris, France.** —*M.R.*

6.8–45 551.5:06

Technical Assistance Programme. *World Meteorological Organization, WMO Bulletin*, 3(4):128–133, Oct. **1954.** 3 photos. **MH-BH**—Report on allocation of funds, and program in Haiti (wind power), Syria (organizing a national meteorological service), Libya, the Dominican Republic, Jordan and Egypt are discussed. *Subject Headings:* **1. WMO. Technical Assistance Program.**—*M.R.*

6.8–46 551.5:63:06

World Meteorological Organization. Commission for Agricultural Meteorology, **Abridged final report of the First Session, Paris, Nov. 3–20, 1953.** Its *WMO*, No. 27, RP. 12, **1954.** 64 p. **DWB**—This abridged final report on the meeting in Paris during Nov. 1953, gives the essential information regarding the meeting, the agenda, resolutions and recommendations, documents and working groups established. Eleven plenary meetings were held, 11 resolutions and 19 recommendations made. The sessions were attended by 47 WMO members,

5 representatives from non-member countries and 2 specialized agencies (FAO and UNESCO), and 6 non-governmental agencies. Subjects treated were: Draft provisional technical regulations, Artificial modification of weather, Bibliography on agro-meteorology; Observational requirements in agro-meteorology; Effect of weather on domestic animals and on plant pathology; Locust control; and Education in agricultural meteorology. Five working groups covering the above subjects were established and their members listed. J. J. BURGOS of Argentina was re-elected president. *Subject Headings:* **1. WMO Commission for Agricultural Meteorology 2. WMO meetings 3. WMO working groups. I. Burgos, J. J.**—*M.R.*

6.8–47 551.509:016.3

Deutsche Meteorologische Gesellschaft, Berlin, Sept. 28–Oct. 4, 1953, **Die Tagung der . . . Gesellschaft, Teil I, Beiträge zur Synoptik.** [Meeting of the Society, Vol. 1, Report on synoptic meteorology.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 2(3), **1954.** 215 p. charts, figs., refs. **DWB**—A compilation of 17 articles presented at the meeting of the Society. Contents will be found in Pt. III, p. 707, May 1955, *MAB*. Articles will be abstracted individually and abstracts run in later issues. *Subject Headings:* **1. Synoptic meteorology 2. Synoptic symposia 3. German Meteorological Society.**—*M.R.*

6.8–48 551.509:016.3

§Germany. Deutscher Wetterdienst, **Die Synoptiker- Tagung in Frankfurt a.M. vom 1. bis 3. November 1954.** [Conference on Synoptics in Frankfurt a.M., Nov. 1–3, 1954.] Its *Mitteilungen*, No. 10, Feb. **1955.** 118 p. figs., tables, refs. **DLC**—At this symposium on synoptics, 20 papers on various aspects of analysis, communications and forecasting were read and discussed by over 40 meteorologists from the analysis and forecast center at Frankfurt and 20 other cities or airport centers in West Germany. Surface and upper air, short, medium and long range, storm, alpine, aviation, marine, industrial, numerical, and local forecasting and analysis were considered. Papers are listed in Contents, Pt. III, p. 710, May 1955, *MAB* and abstracted separately. *Subject Headings:* **1. Synoptic symposia 2. German Meteorological Service (West Zone) 3. Forecast methods 4. Collected works 5. West Germany.**—*M.R.*

6.8–49 551.521.63:615.8

Dantsig, N. M., **Soveshchanie o prirodnom ul'trafioletovom izluchenii.** [Conference on natural ultraviolet radiation.] *Gigiena i Sanitariia*, Moscow, 3:61–62, March **1953. DLC**—Minutes of the conference convoked by the Commission of Radiation Technology, Academy of Sciences of the U.S.S.R. (Dept. of Technical Sciences) and numerous other organizations at Yalta on Sept. 28–30, 1952 are presented. The conference was devoted to the problems of research on and utilization of natural solar ultraviolet radiation in medical practice and preventive medicine, especially in health resorts. The main problems discussed were: the biological effect and hygienic evaluation of natural ultraviolet radiation; characteristics of the ultraviolet climate and methods of its quantitative evaluation and dosimetry; the necessity of developing studies of heliotherapeytics, climatology and actinometry in the southern (Crimean and Caucasian) health resorts. *Subject Headings:* **1. Ultraviolet radiation 2. Medical meteorology 3. Heliotherapy 4. Conferences.**—*A.M.P.*

6.8–50 551.579:551.45:06

United Nations Educational, Scientific and Cultural Organization, Advisory Committee on Arid Zone Research, **Compte Rendu de la Sixième Session, Montpellier, 3–10 Novembre 1953.** [Proceedings of the 6th session, Montpellier, Nov. 3–10, 1953.] *International Union of Geodesy and Geophysics, Bulletin d'Information*, 3(5):80–98, April **1954. DWB**—The meeting at Montpellier Univ. on Nov. 3–6, 1953 was followed by a symposium on ecology of plants Nov. 7–10. Members of the Advisory Committee (7), representatives of special agencies (FAO, WMO and WHO), of non-governmental institutions (I.U.G.G.), etc. are listed. Agenda (24 items), summary of action taken and program of the Arid Zone Committee for period May 1–Oct. 1, 1953, publications, expeditions to Sahara and Sudan, relations with WMO and UNESCO treated. Projects and discussion cover hydrology, dew, use of solar

and wind energy, desert climates, use of salt water, and soil moisture conservation. *Subject Headings:* **1. Arid zone research 2. UNESCO. Advisory Committee on Arid Zone Research 3. Montpellier, France.**—*M.R.*

6.8–51 388.9:06

United Nations. Economic and Social Council, **New structure of the International Civil Aviation Organization (ICAO).** Its *Terminology Bulletin*, 74, Corrigendum 1, May 2, **1951.** 7 p. *United Nations* [*Document*] ST/CGS/Ser.F/74/Corr.1. In English and French. **MH-BH**—Gives equivalents in French of English terms for the various branches of ICAO. *Subject Heading:* **1. International Civil Aviation Organization.**—*C.E.P.B.*

6.8–52 551.5(05)

Revista Meteorológica del Peru, Lima. [Meteorological Review of Peru.] Vol. 1, No. 1, Dec. **1954.** 58 p. illus., tables. Ed., Bartolomé Dextre F., address Prolongación Cangallo 379, Lima, Peru. **DWB**—The first issue of this new meteorological journal, which has format and contents similar to the **Revista Meteorologica** (Montevideo) and **Nimbus** (La Paz) contains a number of articles which are translated from *Weatherwise*, the **W.M.O. Bulletin,** several original articles, climatic data for Peru, sun and moon rise and set data for Lima, editorials and comments on the new publication, professional ethics and practical aspects of Peruvian meteorology. *Subject Headings:* **1. Serial publications 2. Peru. I. Dextre F., Bartolomé** (*ed.*).—*M.R.*

EDUCATION, HISTORY AND BIOGRAPHY

See also: **Ocean met.** (Parkhurst), 6.8–60; **History of phenology** (Williams), 6.8–90.

6.8–53 551.5

Affronti, Filippo, **Iniziative di divulgazione meteorologica.** [Attempts at the popularization of meteorology.] *Rivista di Meteorologia Aeronautica*, 14(1):49, Jan./March **1954.** 4 photos. **DWB**—The importance of popularizing meteorology among the general public and of arousing interest in meteorology is discussed. An attempt at such popularization in Italy is described. *Subject Heading:* **1. Popular meteorology.**—*I.L.D.*

6.8–54 551.508.41(09)

Bell, Geoffrey Howard and Bell, E. F., **Old English barometers.** Winchester, England, Warren, **1952.** 42 p. 40 plates, refs., p. 40. **DLC**—Over 40 early barometers are shown on glossy plates, and their origin described in the text according to the various types in vogue in the 17th and 18th centuries in England. These are: cistern, siphon, portable, diagonal, wheel, double and marine barometers. The mercury barometer, especially the "wheel" type (which later was adapted to the aneroid barometer that is now prevalent), together with elaborate decorations, fancy cases or stands, and accessories such as thermometers, hygrometers, levels, clocks and calendars, as well as weather indicators, became popular as home or palace decorations. The history of invention or development of each type is set forth, with literary references, and notes on the manufacture, etc. Boyle, Hooke and Torricelli are among the important scientists who figure in the development of the barometer. *Subject Headings:* **1. Barometers 2. History of barometry 3. English barometers 4. England.** —*M.R.*

6.8–55 061.2(09)(43)

Degen, Heinz, **Geschichte der Gesellschaft Deutscher Naturforscher und Ärzte, IV, Lorenz Oken und seine Isis um die Gründungszeit der Gesellschaft Deutscher Naturforscher und Ärzte.** [History of the Society of German Naturalists and Physicians, pt. 4, Lorenz Oken and his Isis about the time of foundation of the Society.] *Naturwissenschaftliche Rundschau*, 8(5):180–189, May **1955.** 2 figs. **DWB**—This history of the freedom of the press and the development of science in Germany includes a reference to A. von Humboldt and a reproduction of his diagram of isotherms (1818). *Subject Headings:* **1. History of societies 2. Germany. I. Humboldt, A.**—*C.E.P.B.*

6.8–56 551.5(09)

Alayza y Paz Soldan, Luis, **Hipólito Unanue, el primer meteorologista peruano.** [Hipólito Unanue, the first Peruvian meteorologist.] *Revista Meteorológica del Peru*, Lima, 1(1):7–12, Dec. **1954. DWB**—A long review of the contents of various chapters in a pioneer work **El Clima en Lima** wherein is discussed temperature, wind, rain, storms, etc. and relation to human health or disease. *Subject Headings:* **1. Unanue, Hipólito 2. Climate of Lima, Peru 3. History of meteorology 4. Lima, Peru.**—*M.R.*

6.8–57 551.5:523.7:92

Danjon, A. (*Dir., Obs. of Paris*), **François Arago, 26 Fevrier 1786–2 Octobre 1853.** [François Arago, Feb. 26, 1786–Oct. 2, 1853.] *L'Astronomie*, Paris, 67:445–464, Dec. **1953.** ports., refs. **DWB**—ARAGO born in Estagil in east Pyrenees, was an astronomer in charge of Paris Observatory and was a prolific writer and a popularizer of science. He wrote many works on atmospheric optics, etc. and astrophysics bordering on meteorology. Regular observations were made at the Observatory under his regime. *Subject Headings:* **1. Arago, François 2. Biography 3. Atmospheric optics. I. Arago, François.**—*M.R.*

6.8–58 551.5:92

†Wegener-Köppen, Else, **Wladimir Köppen. Ein Gelehrtenleben. Nach Köppens eigenen Aufzeichnungen unter Mitwirkung von Professor Erich Kuhlbrodt, Hamburg, zusammengestellt von Else Wegener-Köppen.** [Wladimir Köppen. A savant's life. From Köppen's own notes with aid of Prof. E. Kuhlbrodt, collected by Else Wegener-Köppen.] Stuttgart, Wiss. Verlagsgesellsch. **1955.** 195 p. portrait, 13 figs., refs. *Grosse Naturforscher*, v. 18, edited by H. W. Frickhinger. **DLC**—Up till 1903 this work was written by KÖPPEN himself, from then until his death in his 93rd year on June 22, 1940, by his daughter. He was born in Russia but studied at Heidelberg, where he met many famous meteorologists. The extraordinary vitality of this famous climatologist is shown by his tremendous activity after retiring from the Deutsche Seewarte in 1919 at the age of 72. In 1926 he became editor, with R. GEIGER, of the great **Handbuch der Klimatologie,** and wrote several parts himself. A list of 526 papers and books published over a period of 72 years (1868–1940) occupies p. 160–193. *Subject Headings:* **1. Biography 2. Bibliography of W. P. Köppen I. Köppen, Wladimir P.**—*C.E.P.B.*

PRACTICAL AND APPLIED METEOROLOGY

MARINE METEOROLOGY AND OCEANOGRAPHY

See also: **Gt. Brit. Inst. of Oceanog.** (Deacon), 6.8–61; **Oceanography in India** (La Fond), 6.8–62; **Reflection of diffuse radiation by sea surface** (Neiburger), 6.8–225; **Wind mixing currents** (Freeman), 6.8–260; **Wind effects on length of day** (Mintz and Munk), 6.8–261; **Wave formation** (Shuleĭkin), 6.8–262; **Energy transfer in wind wave spectrum** (Yoshida), 6.8–263.

6.8–59 551.5(26)(02)

Seilkopf, Heinrich, **Maritime Meteorologie.** [Maritime meteorology.] Berlin, Gebr. Radetzki, **1939.** 150 p. 35 figs., (incl. photos). Cloud photos (in color), following p. 150. *Handbuch der Fliegerwetterkunde*, ed. by Richard Habermehl, v. 2. **DLC**—Simple but comprehensive coverage of maritime meteorology and climatology, marine observations and broadcasts, etc., for marine aviation. Includes charts of icing danger, models of air flow over mountains and through straits, discussion of dust, winds aloft, sea conditions and their effect on air currents, general circulation, trade winds, doldrums, monsoons, westerlies, jet stream effects (Strahlströmungseffekt) with schematic diagram of same and a world chart showing routes of German Weather Reporting Merchant Ships in 1936, and discussion of aerological observations (winds aloft and soundings) at sea in earlier years. *Subject Headings:* **1. Marine meteorology 2. Marine aerology 3. Textbooks. I. Habermehl, Richard** (*ed.*).—*M.R.*

6.8–60 551.5(26)(09)

Parkhurst, P. G., **Ocean meteorology: a century of scientific progress, Pt. 2.** *Marine Observer*, 25(168):83–87, April **1955. MH-BH**—This part of the article deals with the con-

troversy about the issue of storm warnings by the British Meteorological Office between 1862 and 1866, the formation of the Meteorological Committee of the Royal Society in 1867, the Treasury Committee on Meteorology and the Meteorological Council. (For Pt. 1, *see item* 6.5–16, May 1955, *MAB.*) *Subject Headings:* **1. History of marine meteorology 2. Marine meteorology.**—*C.E.P.B.*

6.8–61 551.46:061.6(410)

Deacon, G. E. R., **The National Institute of Oceanography.** *Nature*, London, 173(4413): 1014–1016, May 29, **1954.** 2 photos. Article with same title in: *Institute of Navigation Journal*, London, 7(3):252–261, July **1954. DLC**—The history of the foundation of the Institute on April 1, 1949 is given. Work on the principal research items is described under: interchange of energy between atmosphere and oceans; response of sea surface to winds; wind driven and thermodynamic circulations in the oceans; free and forced oscillations in the oceans; productivity of ocean waters; whale research; new methods. The Institute is set up at Wormley Hill, Witley, Surrey. Liaison with other authorities and the "R.R.S. Discovery II" are described. *Subject Headings:* **1. Oceanographic research 2. Oceanographic institutes 3. Great Britain. National Institute of Oceanography 4. Wormley, England.**—*C.E.P.B.*

6.8–62 551.46

LaFond, E. C. (*Andhra Univ., Waltair, S. India*), **Oceanography in India.** *American Geophysical Union, Transactions*, 34(6):958–959, Dec. **1953. MH-BH**—A short review of the various activities engaged in at present by universities, institutions and individuals along lines of physical and biological oceanography. The Indian Meteorological Dept. collects ship and coastal data on sea, swell, waves, currents, density and makes turbulence and evaporation studies on shipboard. Microseisms and storms are also studied at Madras and Bombay. The Navy has wave recorders and underwater sound research at Cochin on the west coast. Several expeditions have been made along the east coast and around the southern tip of Cochin. Students have been sent to the Univ. of Florida and to Washington (State) and to New York Univ. *Subject Headings:* **1. Oceanographic research 2. India.**—*M.R.*

6.8–63 551.55:551.46

*Chase, Joseph (*Woods Hole Oceanogr. Inst.*), **A comparison of certain North Atlantic wind, tide gauge and current data.** *Journal of Marine Research*, 13(1):22–31, Oct. **1954.** 5 figs., 11 refs. **DWB**—Wind components from large areas within the zones of the trades and westerlies of the North Atlantic Ocean are determined by means of a geostrophic template and mean weather maps. These wind speeds are compared with current wind speed data from the trade-wind zone as well as the Gulf Stream and tide gage data from Bermuda-Charleston, Galveston and Miami. In long-term averages, the trade winds undergo monthly fluctuations which are similar to those of the current speeds. The monthly fluctuations of the trades plus westerlies are similar to those of sea level slope between Bermuda and Charleston and to those of sea level height at Galveston. While short-period average winds may be measured easily by the template method, their correlation with the corresponding current and tide gage data is relatively poor. *Subject Headings:* **1. Wind components 2. Ocean current speeds 3. Wind speed data 4. Tide gage data.**—*Author's abstract.*

6.8–64 551.461

Texas, A. & M. College. Dept. of Oceanography, **Oceanographic survey of the Gulf of Mexico.** Contract N7-onr-48702, Project NR 083 036, Annual report, June 30, 1953–June 30, 1954. Sept. **1954.** 14 p. diagrs. **DWB**—One deep water oceanographic cruise was undertaken with the new research vessel in March 1954. Two bay surveys were made of Mobile Bay, Alabama. Of sixteen total oceanographic cruises taken during the past year, personnel of the project participated on eleven for a total of approximately 275 man days at sea. Fifty-six man days were spent in the field on the two bay surveys by personnel from the project. Oceanographic data from M/V "Alaska" cruises were processed and sent to the U. S. Navy Hydrographic Office for additional computation. Sixty-three deep sea reversing thermometers were calibrated in a tank built by the project for this purpose. Five technical reports were

distributed during the year. A number of students and staff members were trained during the year and gained valuable experience both at sea and ashore. *Subject Headings:* **1. Oceanographic surveys 2. Progress reports 3. Gulf of Mexico. I. Austin, George B., Jr.**—*Author's abstract.*

6.8–65 551.464

Pritchard, D. W. (*Johns Hopkins Univ.*), **A study of the salt balance in coastal plain estuary.** *Journal of Marine Research*, 13(1):133–144, Oct. **1954.** 4 figs., table, 15 eqs. **DWB**—Observations of salinity and current velocity taken in the James River estuary are used in this investigation. Time means are taken over several tidal cycles and the nonadvective motions and nonadvective salt flux are related to these means. The analysis shows that in the James River estuary the horizontal advective flux and the vertical nonadvective flux of salt are the most important factors in maintaining the salt balance. The vertical advective flux is of secondary importance but is still significant. The horizontal nonadvective flux of salt is small. In addition, the vertical nonadvective flux of salt is partly related to the magnitude of the oscillatory tidal currents. *Subject Headings:* **1. Salinity balance of estuaries 2. James River.**—*Author's abstract.*

6.8–66 551.46

LaFond, E. C., **Physical oceanography and submarine geology of the seas to the west and north of Alaska.** *Arctic*, Montreal, 7(2):93–101, Sept. **1954.** 11 figs., 10 refs. **DLC**—The principal oceanographic activities in the seas around Alaska since 1933 are outlined. General results are summarized in brief chapters on submarine topography, sediments, horizontal and vertical temperature and salinity structure, water masses, currents and ice. *Subject Headings:* **1. Physical oceanography 2. Arctic seas.**—*G.T.*

6.8–67 551.509.59:551.311.18(268)

Winchester, James W. (*U. S. Fleet Weather Center*), **A study of the movement of Arctic Sea in the Canadian Arctic in relation to meteorological, geographical and oceanographic parameters.** *American Meteorological Society, Bulletin*, 35(9):417–427, Nov. **1954.** 17 figs., 7 refs., 4 eqs. **MH-BH**—The author develops an ice forecasting technique on the basis of the following theoretical considerations: the direction and magnitude of the mass transport currents in the ocean computed from the distribution of vertical density; the direction of the mass transport current in restricted channels; the direction of the tidal current in restricted waters; and the relationship between ice drift and surface velocity. The theoretical analyses are compared with (1) observational data for ice movements in Lancaster Sound due to wind stress, (2) ice convergence in Barrow Strait due to tidal currents, and (3) ice movement in Resolute Bay due to tidal currents. *Subject Headings:* **1. Forecasting techniques 2. Ice forecasting 3. Ocean currents 4. Tidal currents 5. Ice movements 6. Arctic Ocean.** —*I.L.D.*

6.8–68 551.501.3:551.524(26):551.526.6

Roll, Hans Ulrich, **Beaufortäquivalente auf See bei verschiedenen thermischen Schichtungen, angewendet auf die Bestimmung der Windschubspannung an der Meeresoberfläche.** [Beaufort equivalents at sea for various thermal stratifications applied to the determination of wind stress on the sea surface.] *Annalen der Meteorologie*, 6(7/8):193–201, **1953/54.** 8 figs., 5 tables, 12 refs. German and English summaries p. 193. **MH-BH**—Estimations of wind force from the state of the sea made on the "Meerkatze" are compared with anemometer measurements at 19.3 m at various temperature differences air-sea ΔT. For a given Beaufort force the measured velocity is nearly constant with $\Delta T - 0.7$ to -0.2°C, then increases, but with much variability. Separate equivalents are calculated for different ΔTs. The wind velocity at 0.5 m is given by $V_{0.5}^{(kn)} = 2.56$ B. Finally author calculates the friction coefficient of wind over water for different wind velocities at 0.5 m for different ΔT, finding an increase with increasing $v_{0.5}$ and ΔT. The results agree with those of J. R. D. FRANCIS in a wind-wave channel. *Subject Headings:* **1. Beaufort scale 2. Wind stress 3. Air-sea temperature.** —*C.E.P.B.*

6.8–69 534

Beyer, Robert T. (*Physics Dept., Brown Univ., R. I.*), **Formulas for sound velocity in sea water.** *Journal of Marine Research*, 13(1):113–121, Oct. **1954.** 2 tables, 16 refs., 12 eqs. **DWB**—Recent measurements by DEL GROSSON show a discrepancy between computed and observed values of sound velocity in sea water. The basis of Kuwahara's formula has been re-examined. The chief cause of the discrepancy lies in the use of a value for the compressibility of pure water that is too large. *Subject Heading:* **1. Sound velocity in sea water.**—*Author's abstract.*

AERONAUTICAL METEOROLOGY

6.8–70 551.5:629.13:06

Verannemann, N. L., **Aeronautical meteorology. First session of the Commission for Aeronautical Meteorology.** *World Meteorological Organization, WMO Bulletin*, 3(4):123–126, Oct. **1954. MH-BH**—First session was held at ICAO headquarters in Montreal in conjunction with fourth session of the Meteorological Div. of ICAO from June 15 to July 14, 1954. Three international organizations and 27 countries sent representatives. A. H. NAGLE presided and W. A. DWYER of Australia was elected vice-president. Three resolutions and 7 recommendations were adopted. Work of the simultaneous sessions (with ICAO) is also reviewed. This dealt with facilities, standards and procedures, codes, etc., technical matters and climatological matters. *Subject Headings:* **1. WMO. Commission for Aeronautical Meteorology 2. Aeronautical meteorology 3. Montreal, Canada.**—*M.R.*

6.8–71 551.509.1:797.5

Wallington, C. E., **World gliding championships 1954.** *Meteorological Magazine*, London, 83(990):368–370, Dec. **1954.** 3 photos. Also in: *World Meteorological Organization, WMO Bulletin*, 4(1):28–29, Jan. **1955.** photo. **DWB**—Upper air soundings to 30,000 ft were made by aircraft near Camphill. Several films of meteorological interest (*e.g.*, Bishop wave) were shown at the World Championship Gliding meet held July 21–Aug. 4, 1954 near Camphill in Derbyshire. Two meteorological office forecasters were assigned to brief pilots on weather, and 9 of 19 teams brought along their own meteorologists. Briefing was interpreted in 3 languages besides English (German, French and Spanish). Facsimile charts supplemented usual teletype weather data and were indispensable in cold damp weather which prevailed. *Subject Headings:* **1. Gliding meets 2. Facsimile map utilization 3. Camphill, Derbyshire, England.**—*M.R., C.E.P.B.*

6.8–72 551.55:527:629.13

Durst, C. S., **The accuracy of dead reckoning in the air.** *Institute of Navigation, London, Journal*, 8(2):91–113, April **1955.** 3 figs., 8 tables, 4 refs., eqs. Discussion p. 109–113. Also: Parker, J. B., **The navigational implications of Mr. Durst's paper.** *Ibid*, 113–116, table. **DWB**—Errors are classified into navigational and wind errors. Wind is calculated from forecasts modified by information collected en route. The standard error of a wind forecast depends on distance and height, exceeding 25 kn for a flight of less than 250 naut mi at 30,000 ft. The errors of wind estimates made by various methods in the air are also estimated. In the discussion it was considered that dead reckoning is no longer sufficiently accurate. J. B. PARKER also analyzed the accuracy of dead reckoning and showed that 8 naut mi per hour flown is far too low an estimate. *Subject Heading:* **1. Air navigation.**—*C.E.P.B.*

6.8–73 551.506.7(265/6)

*U. S. Office of Naval Operations, **Tables of winds and their aiding and retarding effect at 850, 700, 500, 300 and 200 MB, Pt. 1, North Pacific Area.** *U. S. Office of Naval Operations, NAVAER* 50-10-526, Jan. **1954.** 275 p. almost entirely tables. 3 charts, 4 figs. **DWB**—Voluminous contingency tables are provided for calculating possible frequency of tail or head wind components at various standard pressure levels in flight across the Pacific. The tables are based on rawin data from 33 selected stations, ships or coordinates in the North Pacific area, for the 5-year period 1948–1953. Pibal data and sometimes gradient wind data for 700,

500, 300 or 200 mb levels were used when rawin data were missing. A separate table is given for each of the 4 seasons: winter, spring, summer and autumn. Network and location of stations are given on charts and in tables. Methods of computation and examples of application of data are shown in introduction. *Subject Headings:* **1. Upper air wind component tables 2. Air navigation aids 3. Upper air climatology 4. North Pacific.**—*M.R.*

6.8–74 551.506.7(261)

*U. S. Office of Naval Operations, **Tables of winds and their aiding and retarding effect at 850, 700, 500, 300 and 200 MB, Pt. 2, North Atlantic Area.** Its *NAVAER* 50-1C-526, March **1954.** 261 p. almost entirely tables. fig., 2 charts. **DWB**—Pt. 1, contained tables of wind speed and heat and tail component frequencies at 850, 700, 500, 300 and 200 mb levels for 33 selected places in the North Pacific. Pt. II contains similar data for 32 selected locations in the North Atlantic between 20°N and 68°N based on 5 years of daytime wind soundings (1948–53). Stations are listed and shown on chart. Data are given for each of the 4 seasons and assume an aircraft speed of 200, 300, 400, 500, 600 and 1000 knots. *Subject Headings:* **1. Upper air wind component tables 2. Air navigation aids 3. Upper air climatology 4. North Atlantic.**—*M.R.*

6.8–75 551.506.7(73)

*U. S. Office of Naval Operations, **Tables of winds and their aiding and retarding effect at 850, 700, 500, 300 and 200 mb, Pt. 3, United States and routes.** Its *NAVAER* 50-1C-526, **1955.** 368 p. almost entirely tables. **DWB**—Daytime observations of upper air winds at 47 stations in the United States for 1947 through 1952. Rawin stations were used (except Billings and Green Bay) in preference to pibal, as results are considered more reliable. Gradient wind data were substituted for observed when no rawin or pibal observations were available, in order to eliminate bias in favor of low speeds. No gradient winds higher than 174 knots (200 mph) were allowed. Tables give winds at 850, 700, 500, 300 and 200 mb for each station for each of 4 seasons and 16 directions and 11 speed groups, and frequency of aid or retard winds for aircraft speeds of 200, 300 and 400, 500 and 1000 knots at 200, 300, 500 mb. In addition frequency distribution of wind aid or retard for 300 knots for 50 air routes in Atlantic, Pacific and N. America are given for 4 seasons at 700, 500, 300 and 200 mb. *Subject Headings:* **1. Upper air wind component tables 2. Air navigation aids 3. Upper air climatology 4. United States.**—*M.R.*

6.8–76 523.4:629

Henry, James P. (*Aero-Medical Lab., Wright Air Dev. Center, Ohio*) **Flight above 50,000 feet: a problem in control of the environment.** *Astronautics*, N. Y., 1(1):12–19, Fall, **1954.** 7 figs., 6 tables, photos. **DWB**—A rambling discussion of biological, physical and mechanical problems of space flight. The climatic or environmental factors which operate to make life possible on earth, and those which operate outside the atmosphere which would make life or activity difficult or impossible are presented in a series of graphic tables. The next orderly step in conquest of space is said to be the development of an orbital satellite observation vehicle. This is completely practicable, whereas travel to another planet is "several orders of magnitude" more difficult. *Subject Headings:* **1. Interplanetary flights 2. Satellite observatories**—*M.R.*

INDUSTRIAL AND ENGINEERING METEOROLOGY

See also: **Thermal gradient in freight cars** (Cagliolo), 6.8–314.

6.8–77 551.5:6

Downs, Harry A.; Sutton, Paul; Purdy, R. T. and Benton, George, **How to use weather forecasts in business planning. Round table discussion, Reconversion Problems School of the Chicago Association of Commerce, Morrison Hotel, Oct. 25, 1946.** Chic., Lecture Reporting Service, **1946.** 15 p. Mimeo. **DWB**—This symposium, in which meteorologists and business men participated, deals with the kind of service which government and private meteorologists can give to businesses of various types, the manner in which power utility companies, farming operations, city planning, etc., can benefit from meteorological information

and ways for making meteorological information more readily available to potential users. *Subject Headings:* **1. Industrial meteorology 2. Weather forecasting 3. Meteorological services.**—*I.L.D.*

6.8–78 551.501:551.578.46

Lamb, H. H., **Snow survey of Great Britain.** *Weather*, 10(5):170–171, May **1955. DWB**—Summary of the uses of a snow survey, especially in sport. *Subject Headings:* **1. Snow surveys 2. Great Britain.**—*C.E.P.B.*

6.8–79 551.526.8

Zorell, Franz, **Der Einfluss des Walchensee-Kraftwerks auf den Temperaturhaushalt des Kochelsees.** [The influence of the Walchensee power station on the thermal economy of Lake Kochel.] *Erdkunde*, 9(1):44–52, **1955.** 5 figs., 4 tables, 16 refs. **DWB**—Temperatures to a depth of 30 m before and after the building of the power station are analyzed. After the power station was built temperatures were lower at the surface but much higher (up to 5°C) below 10 m. This is attributed to the high velocity with which water from the power station enters the lake. *Subject Headings:* **1. Lake temperatures 2. Lake Kochel, Germany.**—*C.E.P.B.*

AGRICULTURAL AND MEDICAL METEOROLOGY

See also: **Technical terms in medicine and biology** (Sargent), 6.8–317; **Medical meteorology** (Kutschera), 6.8–318; **Biophys. adaptation . . .** (Herrington), 6.8–319; **Ind. hygiene in farming** (Letavet), 6.8–320; **Mortality and weather** (Obenland), 6.8–321; **Man and the atmos.** (Mörikofer), 6.8–322; **Climatic adaptation in barley breeding** (Grafius and Dirks), 6.8–323; **Drift of radioactive dust . . .** (Gabites), 6.8–339; **Atmos. radioactivity . . .** (Garrigue), 6.8–340; **Effects of radioactive debris . . .** (Harris), 6.8–341; **Atomic explosions and weather** (Machta and Harris), 6.8–342; **Effects of thermonuclear explosions . . .** (Martin), 6.8–343; **Atomic explosions and weather** (Mason), 6.8–344.

6.8–80 551.5:63:06

Beall, James M., **A proposal for a revitalized agricultural meteorological service.** *American Meteorological Society, Bulletin*, 35(9):400–403, Nov. **1954. MH-BH**—Agricultural meteorology in the U. S. Weather Bureau from 1940 to date is discussed. Technical requirements for a well-rounded agricultural program in the Bureau are developed. This program envisions service on state level through cooperation with local Extension Service personnel, research and observations in collaboration with Experiment Stations and expanded forecast program with thrice weekly issuance of five-day forecasts, agro-climatic research using the facilities of the National Weather Records Center, development of instruments for measuring agro-meteorological parameters and the evaluation of effectiveness of weather control measures. *Subject Headings:* **1. Agro-meteorological services 2. Agro-meteorological forecasting 3. U. S. Weather Bureau.**—*Author's abstract.*

6.8–81 551.5:63:001 551.58:63:001

Robertson, George W., **Agro-meteorology.** *Canada. Dept. of Agriculture. Experimental Farms Service, Cereal News*, 1(90):8–12, Sept. **1953.** table. **DA**—Agro-meteorology is defined and distinguished from agro-climatology essentially by its micro- rather than macro- or long term relationship of weather to plant development or crop yield. Experiments under way in agro-meteorological research by the Division of Field Husbandry, Soils and Agricultural Engineering beginning in 1952 and extended in 1953 to cover a wide range of conditions from Ottawa to Fort Simpson, N.W. Territory are briefly outlined. Choosing representative varieties of crops for the experiments (wheat, oats, barley, millet, spinach, beets and pumpkin) was done systematically. Meteorological factors observed regularly are listed. Temperature, moisture, tension and light are the 3 most important factors. *Subject Headings:* **1. Agricultural meteorology 2. Agricultural climatology 3. Agro-meteorological research 4. Definitions 5. Canada.**—*M.R.*

6.8–82 662.2:539.1:612.6

Biological hazards of radiation. *Nature*, London, 175(4460):695–697, April 23, **1955. DWB**—An account of the discussions at various levels on the genetic effects of the fall-out of radio-active matter from the thermo-nuclear bomb. It is concluded that we have insufficient knowledge to predict whether there is any appreciable danger, including insufficient knowledge of the movements of the atmosphere at great heights. Radioactivity of the planet has slightly increased as a result of the bomb explosions. *Subject Headings:* **1. Atomic explosion effects 2. Radioactive fallout.**—*C.E.P.B.*

6.8–83 662.2:539.1

Cockcroft, Sir John, **Radiological hazards from nuclear explosions and nuclear power.** *Nature*, London, 175(4464):873–875, May 21, **1955. DWB**—The concentration of radio-activity over England due to distant bomb explosions is about 1% of natural radioactive dust. Nearly all the radiation is absorbed by brick houses. The average dose received during a generation is estimated as less than 0.003 r; anything less than 12.5 r is harmless. Other effects such as production of nitric acid and absorption of solar radiation by dust are also harmless. The genetic effects of an atomic war would be the least of the evils. By-products of nuclear power development can be disposed of safely. *Subject Headings:* **1. Atomic explosion effects 2. Radioactive fallout 3. England.**—*C.E.P.B.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Canadian-U. S. Arctic weather station,** 6.8–36; **Island weather station** (King), 6.8–40; **Beaufort scale** (Roll), 6.8–68; **Pyrheliometer calibration** (MacDonald, Foster), 6.8–95; **Radio propagation** (Schumann), 6.8–183; **Ionospheric data,** 6.8–189; **Methods of obs. at sea** (WMO), 6.8–241; **Visibility measurem.** (Sytinskaia), 6.8–333.

6.8–84 551.501.45:519.241.2

Jenkinson, A. F., **The frequency distribution of the annual maximum (or minimum) values of meteorological elements.** *Royal Meteorological Society, Quarterly Journal*, 81(348): 158–171, April **1955.** 3 figs., 10 tables, 6 refs., 46 eqs. **DWB**—The annual maxima of a meteorological element are represented by $x=a(1-e^{-ky})$, where the shape of the curve depends on k ($k=0$, straight line; k positive, concave upwards; k negative, convex upwards). Hence the probability that the annual maximum value will be less than x is $\exp\left[-\left(1-\frac{x}{a}\right)^{1/k}\right]$. Examples are given of curves for various elements and of the method of calculating the probable maximum in T years. *Subject Headings:* **1. Calculation of maxima 2. Statistical methods.**—*C.E.P.B.*

6.8–85 551.501.6:551.571

Tenani, M., **Grafico per il calcolo del punto di regiada mediante lo psicrometro.** [Nomogram for calculation of the dew point from psychrometric readings.] *Annali di Geofisica*, Rome, 6(4):447–450, Oct. **1953.** fig. Italian and English summaries p. 450. **MH-BH**—A remarkably practical dew-point nomogram is presented and explained. It is based on the wet bulb temperature and the wet bulb depression, rather than the usual dry bulb temperature and depression. The area for 1/2°C on each side of every fifth degree of dew point is shaded so that one can more easily spot the dew point values, and interpolation is not necessary since all curved (dew point) lines are for the 1/2°, rather than the even degree values (dew points are always calculated to whole degrees, anyway). *Subject Headings:* **1. Dew point calculation 2. Nomograms.**—*M.R.*

6.8–86 551.501.6(02):551.571

U. S. Air Weather Service, **Dew point-relative humidity conversion chart.** *U. S. Air Weather Service, Technical Report*, 105-72, April **1951.** 4+3 p. chart. **DWB**—A nomogram

for use by reconnaissance observers is described for converting dew point (depression) t relative humidity or vice-versa, in the range from 0 to 100% r.h. and −50° to +50°C. Th lines of dew point depression are curves spaced for every whole degree (depression) from 1 t 14°C, and every 2° from 14 to 20 and 4° from 20 to 36°C. The chart is based on the simpl formula $f=\frac{e}{e_s}\times 100$ or relative humidity $(\%)=\frac{\text{v.p. (mb)}}{\text{sat. v.p. (mb)}}$ at existing temperature using sa uration vapor pressure over water at <0°C, in accord with WMO procedures. *Subject Head ings:* **1. Dew point-relative humidity nomograms 2. Conversion charts 3. Observers manuals** —*M.R.*

OBSERVATIONAL DATA

See also: **Met. observ.,** 6.8–9; **IGY 1957/58** (Van Mieghem), 6.8–30; **Arctic air expedition,** 6.8–32; **Iowa State College equipment** (Stewart), 6.8–34; **Tables of winds for N. Pacific,** 6.8-73; **. . . for N. Atlantic,** 6.8–74; **. . . for U. S.,** 6.8–75; **Ionospheric data,** 6.8–189.

6.8–87 551.506.1(783):681.177 551.524.37 551.582.2(783

*South Dakota. State College of Agriculture and U. S. Weather Bureau, **Cooperativ project in climatology.** First-Third Annual Progress Report, July 1, **1952,** July 1, **1953** an July 1, **1954.** 3 pieces. forms. Mimeo. Also: Pengra, Ray F. (*S. D. St. Coll. of Agr.* and Manguson, M. D. (*U. S. W. B., Huron, S. D.*), **Likelihood of damaging low temperature during the growing season.** *South Dakota. State College. Agricultural Experiment Station Bulletin,* No. 441, Aug. **1954.** 27 p. 26 figs., 6 tables, 5 refs. **DWB**—Project was designe to place on punch cards all of the climatological and meteorological records for the state c South Dakota. Work was organized by the Agricultural Experiment Station, carried ou by the Agricultural Economics Dept. of the State College and the U. S. Weather Bureau sectio center at Huron. By July 1, 1954 over a million cards had been punched for daily observation for 63 stations and 100,000 for hourly records (1 station). Weekly summary cards are als punched currently. A map shows location of stations punched, and an index of station gives length of record for each. Design of cards is discussed in detail and examples included i report. Research projects, using punched cards, were outlined. In their article, PENGRA and MAGNUSON define a freeze in several ways to allow for different types of frost damag to different species or crops to be correlated. Dates with minimum temperature of 34° 32°, 28° and 24°F or lower, and probability of such temperatures on 40%, 30%, 20%, 10% o 5% of the days before or after a given date in fall or spring, respectively, are given in table and shown on diagrams for 24 stations in South Dakota. Stations and records charts ar carefully described. The data are compiled from previous card data processed by the South Dakota State College and U. S. Weather Bureau at Huron in 1952–1954 and presented at th beginning of this abstract. *Subject Headings:* **1. Climatic data 2. Punched card program 3. Observational data 4. Frost hazard data 5. Climate of South Dakota 6. Huron, S. D** —*M.R.*

6.8–88 551.506.7(564.3

*Great Britain. Meteorological Office, **Upper air data for stations maintained by th Meteorological Office. Summaries of radiosonde observations of temperature and humidity and of radar wind measurements at standard pressure levels, 1947–50, Part 6. Nicosia.** Lon don, H.M.S.O., **1954.** 48 p. 5 plates, 9 tables, 11 refs. At head of title *M.O.* 555 (Pt. 6) mainly tables. Mimeo. **DWB**—Monthly means (separate years and averages) of tem perature at pressure levels to 40 mb and excess of temperature at 16 h over 4 h, frequencie at 4 hours for months and years, tropopause temperature and pressure, frequencies of height of pressure levels, relative humidity and mixing ratio 4 and 16 h, and tables of wind direction and speed. Plates show the values graphically. The introduction explains the tables (For Pts. 1–4, *see items* 5D–209, April 1954 and 4.3–43, March 1953, *MAB*; for Pt. 5, *see item* 6.4–33, April 1955, *MAB.*) *Subject Headings:* **1. Upper air data 2. Nicosia, Cyprus.**—*C.E.P.B*

6.8–89 551.506.8(82)

Van Gool, Emilio, **Comportamiento fenológico y fecha óptima de plantación de cuatro variedades de papa, en Balcarce.** [Phenological behavior and most favorable planting date for four varieties of potatoes in Balcarce.] *Meteoros*, Buenos Aires, 4(1/2):54–68, Jan./June **1954.** 3 figs., table, 19 refs. Spanish and English summaries p. 54. **DWB**—The author investigated the phenological behavior of four potato varieties, *Katahdin*, *White Rose*, *Sebago* and *Huincul* in the Balcarce region, on the basis of continuous planting carried out in Belcarce during 1950–51, 1951–52 and 1952–53. The pentad values of maximum, minimum and mean temperatures of three daily observations, of relative humidity and rainfall in Balcarce for each year and the phenological record of each of the varieties are presented. Correct planting dates were determined and it was observed that earlier planting produced greater yields. *Subject Headings:* **1. Phenological observations 2. Potatoes 3. Balcarce, Argentina.**—*I.L.D.*

6.8–90 551.506.8

Williams, C. B., **Phenology: the study of the seasons.** *Advancement of Science*, London, 11(43):267–272, Dec. **1954. DLC**—A discussion of relation between amateur and professional scientists is illustrated by reference to phenology. A history of the subject is given with a brief statement of phenological activities in different countries. *Subject Headings:* **1. Phenology 2. History of phenology.**—*C.E.P.B.*

INSTRUMENT CARRIERS

See also: **Investig. of ionosph.,** 6.8–131; **Explor. of ionosphere** (Chapman), 6.8–135; **Ion composition** (Johnson, Meadows), 6.8–153; **Ionosphere research** (Lien, others), 6.8–162.

6.8–91 551.507.2

Roll, H. U., **Ein weiterer Schritt zur Verbesserung des Bordwetterdienstes.** [A further step to improving the ship weather service.] *Wetterlotse*, No. 86:82–83, April **1955.** Also: Brogmus, Willi, **Fischereiforschungsschiff "Anton Dohrn" in Dienstgestellt.** [Fishery observation ship "Anton Dohrn" comes into service.] *Ibid.*, p. 83–86. fig. **DLC**—The success of the fishery warning ship "Meerkatze" has led to the demand for a sister ship, and the ship "Anton Dohrn" was commissioned on March 3, 1955. A description of the ship and the meteorological installations is given. *Subject Heading:* **1. Weather ships.**—*C.E.P.B.*

6.8–92 551.507.321.4

Saha, K. R., **The aerodynamic resistance of tethered balloons.** *Science and Culture*, Calcutta, 20(4):195–197, Oct. **1954.** 9 refs. **DLC**—The resistance curve (drag coefficient) of a tethered balloon is different from that of a freely rising pilot balloon, or one in a wind tunnel. Numerous observations were made between Jan. and May 1954 over the flat country at Ambala Airport, India, with a tethered balloon, and the resulting coefficients of aerodynamic resistance plotted and compared graphically with curves obtained by other authors and other types of balloons. Theory is derived and illustrated diagrammatically. It is shown that assumption of sphericity at all wind velocities leads to inaccuracies at medium and high wind speeds. *Subject Headings:* **1. Captive balloons 2. Drag coefficient of balloons 3. Aerodynamic properties of balloons 4. Ambala Airport, India.**—*M.R.*

6.8–93 551.556:551.507.361 551.596.1

Temple Univ. Research Institute, **Research in the physical properties of the upper atmosphere.** Contract W19–122–ac–12, Report No. 2, Nov. 24, **1948.** 22 p. 6 figs., eqs. **DWB**—Developmental work is reported in laboratory equipment for shock wave studies and theory of ultrasonic waves in liquids and air. Also theory of wind effects on a parachute falling (with a warhead) from high altitudes. This is important for location and preservation of instrumental equipment falling by parachute from a rocket ascent. *Subject Headings:* **1. Wind effects on parachutes 2. Rocket instrumentation 3. Ultrasonic waves.**—*M.R.*

INSTRUMENTS

See also: **Iowa State College equipment** (Stewart), 6.8–34; **Temp. fluctuations** (Kassander), 6.8–35; **Old English barometers** (Bell, Bell), 6.8–54; **Charge density in ionosph.** (Berning), 6.8–127; **Solar X-rays** (Byram et al.), 6.8–132; **Actinometric measurem.** (Drummond, Wentzel), 6.8–219; **Atmos. turbulence, aerosols, gases** (Cramer, others), 6.8–251; **Microclimatology,** 6.8–273.

6.8–94 551.508

Thickstun, William R. (*Chief, U. S. W. B., Instr. Div.*), **Weather Bureau improvements in meteorological instrumentation.** *Weatherwise,* 7(4):96–100, Aug. **1954.** 8 figs. (incl. photos.) **MH-BH**—Air-borne radar for meteorological observations, an automatic observer, a new device for measuring water vapor content of the atmosphere (infrared hygrometer), and a quick response, rotating beam ceilometer are among the developments of the U. S. Weather Bureau Instrument Division in the past few years. The last two devices are described in detail and illustrated. *Subject Headings:* **1. Instrument development 2. Infrared hygrometers 3. Ceilometers.**—*M.R.*

6.8–95 551.508.21:551.501.9

MacDonald, T. H. and Foster, Norman B. (both *U. S. W. B.*), **Pyrheliometer calibration program of the U. S. Weather Bureau.** *Monthly Weather Review,* 82(8):219–227, Aug. **1954.** 2 figs., 6 tables, 17 refs. **DWB**—A new system developed for calibrating the horizontal incidence pyrheliometer is described. The pyrheliometers to be calibrated are exposed simultaneously with a standard pyrheliometer in an integrating sphere. Calibrations are made by comparing voltages developed by the instruments undergoing calibrations with those of the standard pyrheliometer. Calibration of the standard pyrheliometer is based on comparisons with the Smithsonian Institution pyranometer, both out-of-doors on clear days and within the integrating sphere. Advantages of the new system include reproducibility of the calibration within less than one percent. This is due to the reproducibility of the radiation field in the integrating sphere, in which there are relatively small variations in ambient temperature. The calibrations can be done much more rapidly and accurately than was formerly the case when the work was done out-of-doors; clear skies and minimum atmospheric pollution were necessary conditions previously. *Subject Headings:* **1. Pyrheliometer calibration 2. Instrument calibration.**—*Author's abstract.*

6.8–96 551.508.25

Albrecht, Hans J. (*Melbourne, Australia*), **A sensitive phototube-amplifier combination for measurements of meteorological radiation at day and night.** *Geofisica Pura e Applicata,* Milan, 29:155–166, Sept./Dec. **1954.** 10 figs., 12 refs., eqs. English and German summaries p. 155. **MH-BH**—The paper describes a new instrument combination for the measurement of various kinds of radiation. The complete set-up is for mobile use and consists of three units, namely: (A) phototube and optical part, (B) amplifier and (C) galvanometer. After a comprehensive introduction to the problems involved, each unit is described in detail and appropriate figures are also included. Another section of the paper covers semi-standard adaptors useful for this instrument, and similar ones, in order to allow controllable readings at all times. Finally, various applications are mentioned. *Subject Headings:* **1. Radiation instruments 2. Photoelectric receivers.**—*Author's abstract.*

6.8–97 551.508.41

Watanabe, Hisao (*Kyoto Gakugei Univ.*), **About some improvements of the siphon barometer.** *Meteorological Society of Japan, Journal, Ser. 2,* 32(1):11–15, Jan. **1954.** In Japanese; English summary p. 11. 3 figs., 3 refs., eqs. **MH-BH**—The diameter of the long branch tube is enlarged as compared with that of the ordinary siphon barometer, and the diameter of the tube is even more enlarged at the surfaces of mercury, but the mercury does not break or run at any inclinations, and the force with which the mercury knocks the closed end of the tube when the tube is inclined is weakened. The height of the column of mercury is measured with small parallax by the aid of two cylinders fixed to the main scale and vernier,

covering the tube at the surfaces of the mercury. By these improvements, this barometer could be made to show the same accuracy as that of the Fortin barometer, with less quantity of mercury. It is more convenient to be carried and is less subject to failure than the Fortin type. *Subject Headings:* **1. Mercurial barometers 2. Barometer improvement.**—*Author's abstract.*

6.8–98 551.508.4:551.508.822

Paetzold, Hans-Karl, **Eine einfache und stabile Barographeneinrichtung.** [A simple and stable barograph arrangement.] *Meteorologische Rundschau*, 8(1/2):17–18, Jan./Feb. **1955.** 3 figs., 2 refs. **MH-BH**—A new balloon barograph is described. Friction is eliminated by a special pen connection and by optical recording. The chamber is beryllium-bronze. Calibration is linear down to 3 mm Hg. Comparison with theodolite measurements shows high accuracy. *Subject Headings:* **1. Aneroid barometers 2. Radiosonde elements.**—*C.E.P.B.*

6.8–99 551.508.53/4

Lang, A., **Verbessertes Schalenkreuz-Kontaktanemometer für universelle Verwendung.** [Improved cup contact anemometer for general use.] *Germany. Deutscher Wetterdienst. Instrumentenamt Nord, Hamburg, Technische Mitteilungen des Instrumentenwesens*, No. 28:40–45, Oct. **1954.** 2 figs., 4 refs. **DWB**—Lists the characteristics which a cup anemometer for general use should have. These include a starting value not exceeding 0.8 m/s, a contact device, which does not admit contact during calm, an anemometer axis free of oscillations, etc. A diagram showing the improved anemometer axis and contact device, and a detailed description of the improved anemometer and of its calibration are given. *Subject Heading:* **1. Cup anemometers.**—*I.L.D.*

6.8–100 551.508.71:536.53

Gilbert, T., **Fehler der Eisen-Konstantan-Thermoelemente bei Feuchtemessungen mit dem thermoelektrischen Psychrometer.** [Errors of the iron-constantan-thermoelement for humidity measurement with the thermoelectric psychrometer.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(3):280–291, **1955.** 5 figs., 3 tables, 10 refs., 8 eqs. German, English and French summaries p. 280–281. **DWB**—Three iron-constantan thermocouples were compared in water and petroleum at 0 and 50°C. In water the greatest difference was 1.1°C, in petroleum smaller. The error is proportional to the temperature difference T (active)$-T$ (passive). To evaluate the total error it is necessary to make a specific calibration for every "passive" temperature, unless the difference from the calibration temperature does not exceed 10°C. *Subject Heading:* **1. Thermoelectric psychrometers.**—*C.E.P.B.*

6.8–101 551.508.71:551.508.822

Nyberg, Alf (*Swedish Met. and Hydrolog. Serv.*), **Improved hygrometers for radiosondes.** *World Meteorological Organization, WMO Bulletin*, 4(1):29–30, Jan. 1955. fig., 3 refs. **DWB**—Rolled hair hygrometers were first used in Germany by FRANKENBERGER (1944) and proved to have better response during radiosonde ascents through inversions, etc., than normal hair hygrometers or even goldbeaters skin hygrometers; tests made in Sweden since Jan. 1954 confirm this finding, so the rolled hair hygrometer has been used for all soundings in Sweden since July 1954. Before long all Scandinavian countries will use rolled hair. Examples of comparative radiosonde records show superior response of the rolled hair element. *Subject Headings:* **1. Hygrometer lag 2. Radiosonde humidity records 3. Hair hygrometers 4. Sweden.**—*M.R.*

6.8–102 551.508.71

Schulze, Werner, **Über die Eichstabilität des gewalzten Haares.** [On the stability of calibration of the rolled hair.] *Annalen der Meteorologie*, 6(7/8):232–238, **1953/4.** 6 figs., 6 refs. German and English summaries p. 232. **MH-BH**—The interpretation of the reading of a hair hygrometer assumes that the relation of the length of the hair to the humidity is stable. This is only true with falling humidity; with rising humidity the reading may be up to 12% too high for a period of 10 min at 80% to some days at 20%. Regeneration begins at

85% but is only complete at 100%. Calibration curves are given. *Subject Heading:* **1. Hair hygrometers.**—*C.E.P.B.*

6.8–103 551.508.77

Allen, F. C.; Glober, R. E.; Garstka, W. U. and Posz, H. M., **Heated precipitation-gage intake tube.** *American Geophysical Union, Transactions*, 36(2):311–314, April **1955.** 2 figs. **MH-BH**—The design and functioning of a heated precipitaton-gage intake tube is described. Heat is transported to a specially constructed intake tube through a vapor-phase system using an evaporable liquid having a boiling point of about 40°F at a pressure of one atmosphere. The source of heat is combustion of liquified petroleum gas in a vented space heater which operated intermittently under thermostatic control. The system provides sufficient heat to prevent the usual capping-over and incapacitation of gages operated under winter conditions. The system was invented as part of the development by the Bureau of Reclamation of an unattended radio-reporting rain and snow gage network now in its third year of service in the Sacramento River Drainage Basin, California. *Subject Headings:* **1. Heated precipitation gages 2. Sacramento River Basin, Calif.**—*Authors' abstract.*

6.8–104 551.508.822

Mitra, H. and Data, M. B. (*Met. Off., New Delhi*), **Lag coefficient of bimetal thermometer of chronometric radiosonde.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 5(3):257–261, July **1954.** 3 figs., 5 tables, 6 refs., 8 eqs. **MH-BH**—The value of lag coefficient of the bimetal thermometer used in chronometric radiosonde of the India Meteorological Department when it is exposed at various orientations to air currents with different speeds has been determined experimentally. The order of errors that may be expected due to lag at different pressure levels has also been computed. The lag coefficient of thermometal element used in chronometric radiosonde is of the order of 8 seconds for an ascensional rate of 18–20 km hr^{-1}. The computed errors caused by this amount of lag is of the order of 0.4°C at 700 mb and 0.5°C at 200-mb level. *Subject Headings:* **1. Thermometer lag 2. Chronometric radiosondes.**—*Authors' abstract.*

6.8–105 551.508.92 551.591.1:551.521.3

Petit, M. and Tassëel, R., **Appareil pour le mesure de la visibilité.** [An instrument for visibility measurement.] *La Météorologie*, Paris, Ser. 4, No. 33:75–97, Jan./March **1954.** French, English and Italian summaries, p. 75. 13 figs., eqs. **MH-BH**—The design and theoretical principle of an instrument for measuring the coefficient of extinction of turbid air are described with the aid of diagrams. The principal parts of this device consist of a projector containing an electric light bulb placed at the focus of a lens, a receiver, and a recorder which is Brion Leroux galvanometer. The error of determination of the coefficient of extinction resulting from the sensitivity of the instrument, practical errors due to visibility of dark objects and visibility of beacons, the verification of the validity of the formulas giving day and night visibility as a function of the instrument, the determination of the mean values of the parameters of the formulas, and the determination of the experimental values of the constants associated with the parameters are discussed. *Subject Headings:* **1. Visibility instruments 2. Extinction coefficient.**—*I.L.D.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **German Met. Society,** 6.8–47; **Conference on Synoptics,** 6.8–48; **Movement of Arctic Sea** (Winchester), 6.8–67; **Gliding championships** (Wallington), 6.8–71; **Ionosphere** (Fedorova), 6.8–140.

6.8–106 551.509

Dady, G., **Quelques reflexions sur le problème de la prévision du temps.** [Remarks on the problem of forecasting the weather.] *La Météorologie*, Paris, *Ser.* 4, No. 34:137–143, April/June **1954.** 5 refs., 6 eqs. French, English and Spanish summaries p. 137. **MH-BH**—After outlining briefly the manner in which forecasting is approached from the classical physical point of view using partial differential equations to determine pressure changes, and the

actual forecasting approach, the author discusses the application of the statistical point of view in forecasting the weather, discusses the use of multiple correlation and NORBERT WIENER's method of extrapolation and its extension to forecasting the pressure field. *Subject Headings:* **1. Weather forecasting 2. Statistical forecasting 3. Pressure changes.**—*I.L.D.*

6.8–107 551.509

Faust, H., **Grössensysteme in der Wetterbetrachtung.** [Scales of magnitude in weather consideration.] *Naturwissenschaftliche Rundschau*, 8(5):196–197, May **1955.** 2 tables. **DWB**—As the period of a forecast increases from ¼ to 48 hours the area over which observations must extend increases from the limits of vision to a hemisphere. FLOHN's classification into micro-, local-, regional-, macro- and global-synoptic is reproduced and discussed. *Subject Heading:* **1. Weather forecasting.**—*C.E.P.B.*

6.8–108 551.509.3

Appleby, James F. (*U. S. W. B., Hydromet. Sec.*), **Trajectory method of making short-range forecasts of differential temperature advection, instability, and moisture.** *Monthly Weather Review*, Wash., D. C., 82(11):320–334, Nov. **1954.** 18 figs., 11 refs. **DWB**—A method is presented of forecasting indices of the strength of horizontal differential temperature advection, instability, and moisture—factors which have been found useful in locating areas of moderate to heavy rainfall. Carefully analyzed data from charts currently used in most forecast programs are used. Examples of the techniques and several cases giving the forecast of parameters and the corresponding observed rainfall are shown. Also included is a comparison of forecast areas of horizontal differential advection and tornado occurrence. *Subject Headings:* **1. Short range forecasting 2. Trajectory forecasting 3. Advection 4. Instability 5. Forecasting techniques.**—*Author's abstract.*

6.8–109 551.509.312:551.509.33

*Massachusetts Institute of Technology, **Extended Forecasting Project. Contract Cwb-8373, Final report for the period, July 1, 1953–June 30. 1954.** 15 p. extensive tables. **DWB**—Reports on progress during the fiscal year 1953–4 in analysis of 1949–50 synoptic data for the world, including the analysis of 5-day mean data from 3 sets of charts (N. H. sea level and 500 mb and S. H. sea level) through Dec. 1950; daily, 5-day mean and monthly profiles and change profiles for 90°N to 70°S; circulation indices for N. and S. Hemispheres; correlation coefficients; and investigation of short term responses of general circulation to solar variations; analysis of current monthly and seasonal synoptic data; and of horizontal (<1940), N. H. climatic, circulation and solar data, including statistical studies and proportion of monthly and seasonal anomalies and forecasts in relation to solar data. Future work in these fields is outlined and extensive tables of daily, and zonal and meridional indices for 1950 are appended. (For Final Report, 1951/52 and 1952/53 *see items* 5.7–110 and 5.9–82, July and Sept. 1954, *MAB.*) *Subject Headings:* **1. Extended forecast research 2. World synoptic data analysis 3. Zonal indices data. I. Willett, Hurd C.**—*M.R.*

6.8–110 551.509.317

Clarke, R. H. (*Central Met. Bureau, Melbourne*), **The use of upper charts in forecasting.** *Australian Meteorological Magazine*, Melbourne, No. 7:26–43, Nov. **1954.** 11 figs., 9 refs., eqs. **DWB**—Empirical rules of MÜLLER-ANNEN and of SCHERHAG for forecasting the field of surface pressure are summarized and the analytical approach to pressure change problems is presented by a mathematical discussion of barotropic theory. Also methods for estimating vertical motion from upper charts including SUTCLIFFE's method, and vertical motion from constant pressure charts; development in relation to thickness patterns; the effect of vertical stability on development and a discussion of ROSSBY's wave theory are presented. *Subject Headings:* **1. Weather forecasting 2. Upper air charts 3. Constant pressure charts 4. Forecasting techniques.**—*I.L.D.*

6.8–111 551.509.317:551.515.3(766)

Sugg, A. L. and Foster, D. S., **Oklahoma tornadoes, May 1, 1954.** *Monthly Weather Review*, Wash., D. C., 82(5):131–140, May **1954.** 28 figs., 18 refs., 2 appends. **MH-BH**—

The discussion covers the synoptic features that preceded the tornadoes, the small scal features such as the advance of the warm front over SE Oklahoma and acceleration of the col front over Western Texas, the thermodynamic characteristics of the atmosphere as reveale by radiosonde analysis and the nature of the Weather Bureau forecasts. The method c radiosonde analysis for severe local storms and tornado forecasting and a method for analyzin and forecasting the stability index field are described in appendices. *Subject Heading* **1. Synoptic conditions for tornadoes 2. Thermodynamics of the atmosphere 3. Tornad forecasting 4. Upper air analysis 5. Oklahoma.**—*I.L.D.*

6.8–112 551.509.31

Hanson, Donald M. (*U. S. W. B. Airport Sta., Kansas City*), **A possible quantitativ use of mean circulation concepts in daily forecasting.** *Monthly Weather Review*, Wash., D. C 82(9):249–254, Sept. **1954.** 6 figs., 2 tables, 2 refs. **MH-BH**—The question of the operatio of large-scale controls in day-to-day weather map evolutions is discussed. To explore th usefulness of these concepts in daily forecasting, the problem of forecasting the passage c summertime cold fronts at Kansas City is used. More-or-less standard techniques are use to develop an objective method of forecasting these frontal passages, and its deficiencies ar discussed. A technique employing certain aspects of the 5-day mean 700-mb chart as a mean of eliminating these deficiencies is investigated. Results suggest that it is possible to us certain features of a prognostic 5-day mean 700 mb chart to improve on the results of an ob jective forecasting method. *Subject Headings:* **1. Objective forecasting 2. Forecastin techniques 3. Frontal passages 4. Forecast improvement.**—*Author's abstract.*

6.8–113 551.509.34:551.524.3

Saunders, W. E., **Night cooling under clear skies at a coastal station.** *Meteorologica Magazine*, 84(993):76–79, March **1955.** 2 figs., 3 refs. **DWB**—The discontinuity in the rat of cooling found at Northolt (*see item* 4.2–60, Feb. 1953, *MAB*) is also found at St. Eva Cornwall and annual variation of time is plotted. Equations are given for temperature a discontinuity on occasions of non-inversion and inversion, and for forecasting minimum tem perature. *Subject Headings:* **1. Minimum temperature forecasting 2. Single station fore casting 3. Cornwall, England.**—*C.E.P.B.*

6.8–114 551.509.

Gringorten, Irving I., **Test of significance in a verification program.** *Journal of Meteo ology*, 12(2):179–185, April **1955.** 2 figs., 5 tables, 8 refs., 22 eqs. **DWB**—Scores for fore casts which give one event out of 2 or more mutually exclusive events (rain or no rain, differen types of cloud) tend to a normal distribution. The test of skill is the degree to which th occurrence of the forecast event exceeds the climatic frequency. This may differ from th 95% confidence limit. *Subject Headings:* **1. Forecast verification 2. Forecasting skill.**— *C.E.P.B.*

6.8–115 551.509.

Schumann, T. E. W., **Proposal for a planned international research programme.** 1954 11 p. At head of p. 1: **X^e Assemblée Générale, Union Géodesique et Géophysique Inter nationale. (I.U.G.G.) DWB**—After discussing the problem of improving forecast accurac the author formulates a series of axioms which underlie improved weather forecasting. Thes axioms involve: 1) increased international cooperation in the dissemination of synoptic data 2) recognition of the fact that synoptic forecasting holds out no prospects of any fundamenta progress; 3) the introduction of objective forecasting methods; 4) increased emphasis on th study of the general circulation by direct observation and 5) the attainment of greater coordina tion, simplicity and uniformity in the publication of meteorological data. *Subject Heading* **1. Forecasting techniques 2. Forecast improvement.**—*I.L.D.*

6.8–116 551.509.5:551.576.4:551.59

§*U. S. Air Weather Service, **Forecasting winter ceilings at Barksdale Air Force Base** Its *Technical Report*, No. 103-92, July **1951.** 26 p. numerous charts (many fold.), 13 refs Photostat. **DWB**—An objective forecast study of conditions favorable for, or indicative of

low ceiling and visibility in winter at Barksdale Base. Data for 445 days (Dec. 1946–50 and Jan. and Feb. 1947/51 inclusive) were used as the sample and Dec. 1943/45 and Jan. and Feb., 1943/46 as the test data. Ascending motion and moisture supply were considered paramount. Direction of flow was also found to be important. The tests indicated that a useful forecast tool had been developed. Charts and scatter diagrams are included. *Subject Headings:* **1. Ceiling and visibility forecasting 2. Objective forecast studies 3. Barksdale Air Force Base, La.**—*M.R.*

6.8–117 551.509.5:551.575.1

*Winden, Warren W., **Objective method of forecasting radiation fog heights.** A report submitted in partial fulfillment of the requirements for the course in Independent Study in the Dept. of Geography, Fresno State College, Jan. **1954.** 41 p. 2 figs. (incl. fold. illus.), 6 tables, 6 refs. **DWB**—An objective method is developed for short range forecasting of fog. The time at which the radiation fog rises to a minimum ceiling height of 300 ft and solar radiation data for each 20 min period (from sunrise to sunset and expressed as radiation per hour) were computed. Observational data for 40 cases of radiation fog were plotted in order to obtain the intensity of solar radiation received from the ground and up to 300 ft ceiling. The time at which the 300 ft ceiling occurred and the solar intensity were determined. The averages of the several values were computed and the graphic distribution of all hourly intensities and their averages with respect to the specified ceiling were related. Correlation of hourly solar radiation intensities with the 300 ft ceiling gave a short forecast period of 2 hours 43 min to 3 hours and 10 min from sunrise; the 300 ft mean solar intensity and the solar time showed 17.2 langleys at 1014 PST; overall clearing occurred at about midday. *Subject Headings:* **1. Objective forecasting 2. Radiation fog forecasting 3. Radiation fog.**—*I.L.D.*

6.8–118 551.509.51:551.575.5

Clarke, R. H., **Objective method of forecasting fog at Rockhampton.** *Australia. Bureau of Meteorology, Meteorological Study*, No. 2, Sept. **1954.** 15 p. 8 figs., 3 tables, 8 refs., eqs. **MH-BH**—A study of a 5-year record of synoptic charts at Rockhampton indicates that radiation and advection fogs and mixing-radiation fog occur with varying frequencies. The author discusses the theory of fog formation by radiation, the forecasting of radiation fog and objective methods. The fog incidence at Rockhampton is examined with reference to its dependence on season, time of day, on cloud amount and on wind vector. Prediction diagrams are presented and their usefulness in predicting fog formation and clearance is considered. *Subject Headings:* **1. Objective forecasting 2. Fog forecasting 3. Fog formation 4. Rockhampton, Australia.**—*I.L.D.*

6.8–119 551.509.52:551.515.2

*U. S. Air Force, **Climatological aid to forecasting typhoon movement.** Prepared by Office of Climatology, Tokyo Weather Central, Hq. 1st Weather Wing APO 925, Aug. **1954.** 35 p. mostly charts. **DWB**—Typhoon tracks for the western Pacific are tabulated by 4° lat. and long. squares to serve as a climatological aid to forecasting direction and speed of movement of typhoons. Two charts are presented for each month from May through Dec.—one set for 104° to 132°E and one for 132° to 160°E (both for area 6° to 42°N lat.), covering period 1920–1930 and 1940–1953. In each 4° square the number of typhoons which figure in the statistics, the mean direction in degrees (1 to 360°) and mean speed (travel distance) in nautical miles per 24 hour (day) period were indicated. Instructions for plotting position and movement of typhoons in actual forecast practice, using these monthly charts, are given. *Subject Headings:* **1. Typhoon statistics 2. Typhoon forecasting aids 3. Typhoon movement forecasting 4. Western Pacific.**—*M.R.*

6.8–120 551.509.52:551.515.2:016

§*†U. S. Air Weather Service, **Forecasting the typhoons of 1949 with special reference to the use of streamline analysis.** Its *Technical Report*, No. 105-78, Aug. **1951.** 88 p. tables, numerous charts, 21 refs. photostat. **DWB**—Elaborate study of methosd of forecasting typhoons as used by the Air Weather Service in Western Pacific in 1949 and study of individual typhoons of that year in respect to streamline analysis techniques used. The synoptic and

climatological charts compiled during this season and for other seasons are reproduced along with basic and derived data, verification data and analyses of situations. The text is intended as a provisional manual for training forecasters in the Western Pacific where typhoons are about the only important bad weather to be forecast. A bibliography on tropical meteorology is included. *Subject Headings:* **1. Typhoon forecasting 2. Tropical meteorology bibliographies 3. Typhoon forecasting manuals 4. Western Pacific.**—*M.R.*

6.8–121 551.509.54

Stidd, Charles K., **Objective estimates of Hawaiian rainfall.** *Pacific Science*, Honolulu 8(3):264–275, July **1954.** 7 figs., 9 refs. **DWB**—The correlation field pattern of mean monthly 700 mb height *versus* monthly rainfall at a point (or the average of 4 points in the same vicinity) is analogous to the composite charts (SOLOT) of pressure for rainy months, or the 700 mb pressure contour chart for any rainy situation. Use of such correlation field pattern charts in long range precipitation forecasting is tested against forecasts made by skilled and unskilled forecasters, and the objective method was found to give the highest skill score. Characteristics of dry and wet index types of mean monthly correlation field pattern charts, and monthly or seasonal variations are discussed and illustrated. Regional differences in precipitation on the various islands of the Hawaiian group are discussed. Limitations of 2-point or of many parameter bases for forecasting are mentioned. *Subject Headings:* **1. Objective forecasting 2. Rainfall forecasting 3. Statistical forecasting 4. Long range forecasting 5. Correlation field pattern charts 6. Oahu, Hawaiian Islands.**—*M.R.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

UPPER ATMOSPHERE—IONOSPHERE

See also: **Report on air pollution,** 6.8–1; **Magneto-hydrodyn. waves** (Alfvén), 6.8–18; **Airplane altimeter** (Sebastian), 6.8–247; **Conductiv. in stratosph.** (Stergis, others), 6.8–338; **Radioactive dust** (Gabites), 6.8–339; **Radioactive debris** (Harris), 6.8–341.

6.8–122 551.510.535:621.396.1

Agy, Vaughn (*Nat. Bur. of Standards, Boulder, Colo.*), **Geographic and temporal distribution of Polar blackouts.** *Journal of Geophysical Research*, 59(4):499–512, Dec. **1954.** 22 figs. 2 tables, 14 refs., eq. **MH-BH**—Tabulations of hourly values of the ionospheric parameter for 18 Northern Hemisphere stations have been used to derive diurnal variations in the occurrence of "blackout" conditions. Contour plots are presented showing the diurnal average percentage of time during which blackout conditions prevailed, the amplitude of the diurnal variation, and the time of maximum frequency of occurrence. Changes in the contours with season and with magnetic activity are discussed. *Subject Heading:* **1. Polar blackouts.**—*Author's abstract.*

6.8–123 551.510.535:551.594.

Argence, Émile and Rawer, Karl, **Sur l'absorption des ondes courtes dans l'ionosphère** [Ionospheric absorption of short waves.] *Académie des Sciences, Paris, Comptes Rendus* 239(13):773–775, Sept. 27, **1954.** 6 refs. **DWB**—Weakening of short-wave radiation due to electron-ion collisions in the F region is mathematically analyzed for the cases of passage through and of reflection from the ionosphere. Values incorporated into the equations are number of charged ions, absolute temperature, mass and charge of electrons, maximum ion concentration, zenithal angle of the sun, etc. The formulas are based on Chapman's law of ion distribution. *Subject Headings:* **1. Ionospheric absorption 2. Ionospheric reflection 3. Electron-ion collisions 4. F region.**—*G.T.*

6.8–124 551.510.535:621.396.81

*Banerji, R. B., **The mechanism of fading of 150 kc pulses.** Pennsylvania. State Univ. Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 71, Nov. 15, **1954.** 29 p. 9 figs., table, 17 refs. **DWB**—A statistical theory of fading due to random ab

sorption of downcoming waves has been worked out. Comparison of this with the theory of random scattering indicates a major point of difference which can be distinguished experimentally. Statistical results obtained with 150 kc waves at the Penna. State Univ. indicate that it is the absorption phenomenon which gives rise to the fading of these waves. On the basis of this result, the statistical theory has been extended to yield a method for the measurement of the height of the irregularities which give rise to the fading. Results indicate a diurnal variation—lower heights in the day and higher at night. A discrepancy with the theory of random fading which was noticed by previous authors working with short waves has not appeared with data at Pennsylvania State University. The reason for the difference is discussed. *Subject Headings:* **1. Radio fading 2. Ionospheric absorption.**—*Author's abstract.*

6.8–125 551.510.535:06

Berg, Hellmut, **Ionosphärentagung 1954 der Arbeitsgemeinschaft Ionosphäre der Deutschen Geophysikalischen Institute in Kleinheubach 28.–30. Oktober 1954.** [1954 Ionosphere Conference of the German Geophysical Institute Working Group for Ionosphere held at Kleinheubach, Oct. 28–30, 1954.] *Geofisica Pura e Applicata*, Milan, 29:234–235, Sept./Dec. **1954. MH-BH**—Brief reviews or listings of a dozen of the principal papers presented at the Conference. The meeting was attended by German scientists who reported latest results in ionosphere and radio propagation research. *Subject Headings:* **1. Ionospheric conferences 2. Kleinheubach, Germany.**—*G.T.*

6.8–126 551.510.535:06

Berg, Hellmut, **Tagung über Physik der Ionosphäre in Cambridge 6.–9. September 1954.** [Conference on Physics of the Ionosphere in Cambridge, Sept. 6–9, 1954.] *Geofisica Pura e Applicata*, Milan, 29:230–233, Sept./Dec. **1954. MH-BH**—About 40 papers delivered at an International Symposium on Physics of the Ionosphere at Cambridge, England are reviewed. The papers are grouped around the following basic subjects: 1) the lowest ionospheric layers, 2) ionospheric disturbances and ionospheric motion, 3) the F_2-layer and 4) mathematical problems of wave propagation in the ionosphere. *Subject Headings:* **1. Conference on Physics of the Ionosphere, Cambridge, Eng. 1954 2. Ionospheric conferences 3. Cambridge, England.**—*G.T.*

6.8–127 551.510.535:551.594.12:551.508.96

Berning, Warren W. (*Ballistic Res. Labs., Aberdeen Proving Ground, Md.*), **The determination of charge density in the ionosphere by radio Doppler techniques.** (In: Boyd, R. L. F.; Seaton, M. J. and Massey, H. S. W. (*eds.*), **Rocket exploration of the upper atmosphere.** London, Pergamon, **1954.** p. 261–273. 6 figs., ref., 20 eqs.) **DWB**—In an earlier paper (Berning, 1951), the author described a method whereby data from the missile tracking system known as DOVAP could be used to obtain equivalent electron densities in the ionosphere. In the present work this theory is analyzed in slightly more detail to show the accuracy limitations in the method. To illustrate these limitations, a study is made of the ionospheric structure for Dec. 15, 1952, which was obtained from DOVAP tracking of a Naval Research Laboratory Viking rocket. It is of interest to note that the vertical structure of a sporadic E cloud is apparently obtained from the record. *Subject Headings:* **1. Electron density 2. Rocket investigations.**—*Author's abstract.*

6.8–128 551.510.535

†*Best, A. C.; Booker, H. G. and Sheppard, P. A., **Radio meteorology in the United Kingdom, 1939–1947.** *International Union of Geodesy and Geophysics. Association of Meteorology, Oslo, 1948, Procès-Verbaux, v. 3, Rapports Nationaux*, pub. Nov. **1950.** p. 126–130. 3 refs. **DWB**—Report on wartime experiments in refraction of microwaves, radio waves in troposphere, absorption and scattering by drops and ice crystals, and conferences held on Radio Meteorology. *Subject Headings:* **1. Microwave research 2. Radio meteorology 3. Great Britain.**—*M.R.*

6.8–129 551.510.535

Bibl, Klaus, **Phénomènes dynamiques dans les couches ionosphériques.** [Dynamic phenomena in the ionospheric layers.] *Académie des Sciences, Paris, Comptes Rendus*, 235(14):

734–736, Oct. 16, **1952.** refs. **DWB**—Ionospheric recordings have been conducted at Freiburg, Germany since Feb. 1952. A new type ionospheric sonde is used for this purpose whose records can be projected on the movie screen, giving motion reduced to 1/300 of its original speed. Transitory ionization trails observed by this method are described. Such transitory perturbations almost invariably have a downward motion. The introduction of the new recording technique provides an explanation for certain chaotic patterns obtained in normal (comparatively slow) recordings, inasmuch as they can be interpreted as snapshots of very quick transitory movement. *Subject Headings:* **1. Ionospheric measurement 2. Ionospheric sondes 3. Transitory ionization trails.**—*G.T.*

6.8–130 551.510.535

Bonnet, G. (*Belgian Congo*), **Une particularité de la couche F2 à Lwiro.** [Peculiarity of the F2 layer at Lwiro.] *Annales de Géophysique*, Paris, 10(4):348–350, Oct./Dec. **1954.** 5 figs., ref. French and English summaries p. 348. **MH-BH**—An analysis of very rapid variations of heights of the F2 nighttime peak during equinoctial periods is given. An increase of the peak altitudes is very often related to the presence of a layer corresponding to a nighttime E layer. *Subject Headings:* **1. F2 variations 2. Lwiro, Belgian Congo.**—*Author's abstract*

6.8–131 551.510.535:551.507.362:535.33.07

Boston University. Upper atmosphere Research Laboratory, **Investigation of the ionosphere utilizing sounding rockets.** Contract AF 19(122)-36, Progress Reports, No. 9 and No. 12, Oct. 24, **1951** and June 30, **1952.** two pieces. photos, graphs, diagrs., ref. **DWB**—Report No. 9—June 1–Aug. 31, 1951: Preparations were made for Aerobee ascent of Aug. 7, 1951. Previously obtained rocket data are being put on IBM cards. The rocket reached 52 mi, just short of the E layer which was determined to be at 60 mi at that time. Recovery of equipment was satisfactory and some of it can be easily prepared for the Oct. 1951 firing. Photographs of equipment before and after firing are included. A television spectroscope has been constructed and preliminary results obtained. Report No. 12—March 1–May 30, 1952. Brief report on firing on April 22, 1952 of Aerobee No. 24 which carried similar instrumentation to Aerobee No. 20 described in Report No. 10. Maximum altitude 70 mi at 180 sec. Some damage occurred to equipment but data were all usable and will be computed in connection with oblique incidence propagation studies. *Subject Headings:* **1. Ionospheric research 2. Aerobee rocket instrumentation 3. Spectrophotographic equipment 4. Punched card analysis 5. White Sands, N. Mex. I. Low, Ward C.**—*M.R.*

6.8–132 551.510.535:523.74:551.508.96

Byram, E. T.; Chubb, T. and Friedman, H. (*U. S. Naval Res, Lab., Wash., D. C.*), **Solar X-rays and E-layer ionization.** (In: Boyd, R. L. F.; Seaton, M. J. and Massey, H. S. W. (*eds.*), **Rocket exploration of the upper atmosphere.** London, Pergamon, **1954.** p. 274–275. fig., 10 refs.) **DWB**—In each of four rocket flights which penetrated the E-region of the ionosphere, solar X-rays (7–10Å) were detected by means of photon counters. Intensity data were telemetered to ground continuously during each flight. No unusual solar activity was observed during any of the experiments. Graph shows transmission (in %) of soft X-rays from 0 to 220 km. *Subject Headings:* **1. E layer ionization 2. Solar X-rays 3. Rocket investigations.**—*Authors' abstract.*

6.8–133 551.510.535

Chaffee, D. D., Jr. (*Penna State Univ.*), **Statistical analysis of "150-km" echo.** *Journal of Geophysical Research*, 59(4):549–550, Dec. **1954.** 2 figs., 3 refs. **MH-BH**—An echo with a marked spring and fall maximum appears in the 150 kc/sec band above the 130 km height and at an average of 150 km (see Lindquist, *J. of Atmos. & Terr. Physics*, 4:10–27, 1953) was investigated. A strong 27-day periodicity appears on a frequency analysis graph, with probability of random cause 0.05 when 3 years of data were used. It was found that for long duration of the 150 km echo a high Kp (planetary magnetic index) must exist. *Subject Headings:* **1. Ionospheric echo (150-km) 2. Twenty-seven day ionospheric cycles.**—*M.R.*

6.8–134 551.510.535:551.590.22

Chapman, Sydney (*Queen's College, Oxford*), **The calculation of the probable error of determinations of lunar daily harmonic component variations in geophysical data: a correction.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 5(1):218–222, March **1952.** 3 figs., table, 6 refs. **MH-BH**—The author refers to the paper **On the practical determination of lunar and luni-solar daily variations in certain geophysical data,** by TSCHU, published in the same journal in March 1949 (*see item* 2.4–66, April 1951, *MAB*) and points out that table 4 in that paper, which deals with the determination of probable error, needs a correction, namely, the reversal of sign of the entries in the columns headed B_r and C_r. The author explains the nature of calculations involved and indicates the necessary corrections. *Subject Headings:* **1. Lunar variations 2. Ionosphere computation tables. I. Tschu, Kwang-Kun.**—*G.T.*

6.8–135 551.510.535:551.507.362

Chapman, Sydney (*Queen's Coll., Oxford, and Geoph. Inst., Univ. of Alaska*), **Rockets and the magnetic exploration of the ionosphere.** (In: Boyd, R. L. F.; Seaton, M. J. and Massey, H. S. W. (*eds.*), **Rocket exploration of the upper atmosphere.** London, Pergamon, **1954.** p. 292–305. 3 figs., 10 refs.) **DWB**—The geomagnetic intensity F at any point is compounded of the mainfield intensity F_0, and contributions f_e, f_i due to changing systems of electric current above and within the Earth; in principle f_e and f_i at the surface can be determined by analysis of the ground magnetic data, and likewise the values of F_0 and f_i at any point above, and of f_e below the Earth's surface; but the values of F_0 and f_i inside the Earth, and of f_e above the Earth, cannot be so determined, nor the location and distribution of the current systems that produce them. Nevertheless, with the aid of ionospheric data the probable approximate location and distribution of the currents there can be inferred. But if F could be measured by rockets in the ionosphere, the actual ionospheric current system could in principle be inferred from curl F. At present rocket-borne magnetometers mainly measure F, and the magnitude of F. Despite this, and the limitation on the number of rocket ascents that can be made, it is suggested that five types of rocket magnetic measurements should be made; the first four, to be made during magnetic storms, are: (1) To shoot a rocket obliquely through an auroral arc, to determine the thickness and intensity of the current flowing along it, by measuring the rapid change of F during the traverse. (2) To measure F by a rocket ascent from the equator somewhat before local midnight and noon, up to at least 150 km, to test whether or not the storm-time part of the magnetic storm field is due to a ring current outside the Earth. (3) To explore the height, thickness, and intensity of the current system over the polar cap. (4) To explore the current distribution in the dark regions near or between auroral arcs in the auroral zone, near the time of maximum current intensity of the westward electrojet. The fifth experiment, to be made during an interval of magnetic calm, is to explore the current system of the daily magnetic variation, by ascents near noon and after midnight, in low and middle latitudes. *Subject Headings:* **1. Ionospheric currents 2. Rocket magnetic measurements.**—*Author's abstract.*

6.8–136 551.510.535:06

Conférence sur la Physique de l'Ionosphere. *International Union of Geodesy and Geophysics, Bulletin d'Information*, 3(5):159, April **1954.** **DWB**—Brief note on Conference on Ionosphere, Sept. 6–9, 1954 at Cavendish Laboratory, Cambridge, to discuss a) lower ionosphere, b) irregular movements, c) F2 layer, d) mathematics of wave propagation in ionosphere. *Subject Headings:* **1. Ionospheric conferences 2. Cavendish Laboratory, Cambridge, England.** —*M.R.*

6.8–137 551.510.535

Delobeau, Francis and Gallet, Roger, **L'amplitude anormale des effets saisonniers dans l'ionosphère équatoriale et la structure de la haute atmosphère.** [Abnormal amplitude of seasonal effects in the equatorial ionosphere, and the upper atmospheric structure.] *Académie des Sciences, Paris, Comptes Rendus*, 239(17):1067–1069, Oct. 27, **1954.** **DWB**—Simultaneous seasonal variation of several ionospheric phenomena was observed in equatorial regions. The variations were larger than might be expected from the comparatively small variations of zenithal angle of solar radiation. The author interprets the phenomenon in terms of seasonal

variations of the atmospheric structure at a given place. *Subject Headings:* **1. Seasonal ionospheric variations 2. Equatorial ionosphere 3. Upper atmosphere structure.**—*G.T.*

6.8–138 551.510.5:535.89

Elterman, Louis, **Seasonal trends of temperature, density, and pressure to 67.6 km obtained with the searchlight probing technique.** *Journal of Geophysical Research*, 59(3): 351–358, September 1954. 7 figs., 2 tables, 4 refs. **MH-BH** —Ninety sets of measurements provided means of temperature, density and pressure mainly for June, Sept. and Oct. 1953 above New Mexico. The familiar picture of a temperature minimum at 18 km and a maximum around 48–52 km was obtained with a well expressed seasonal variation above this height. Temperature profiles measured within 48 hours agreed well up to 50 km and showed large variations above this height. Simultaneous searchlight, rocket, anomalous sound and radiosonde temperature measurement carried out within a 14-hour period, lead to similar results. The anomalous sound measurements, however, gives consistently lowert emperatures than the searchlight technique. *Subject Headings:* **1. Searchlight technique 2. Upper atmosphere 3. High altitude profiles 4. Albuquerque, New Mexico.**—*A.A.*

6.8–139 551.510.535:551.590.22

Eyfrig, Rudolf, **Une influence lunaire sur l'altitude du centre de la couche ionosphérique F_2.** [Lunar effect on the median height of the ionospheric F_2-layer.] *Académie des Sciences, Paris, Comptes Rendus*, 235(14):736–737, Oct. 16, **1952. DWB**—Brief note on diurnal and seasonal variation in the height of the (M 3000) F_2 factor at Huancayo, Peru and Freiburg, Germany. An analysis of values of the factor obtained at the two places indicates that a marked 12-hour periodicity (with an amplitude of $\pm 3\%$) showing maxima at lunar noon and midnight exists at Huancayo from Nov. to Feb., while no similar lunar effect could be found at Freiburg. More conclusive results can be expected from more accurate measurements which are being conducted now at the latter place. *Subject Headings:* **1. F2 variations 2. Lunar influences.**—*G.T.*

6.8–140 551.510.535:621.396

Fedorova, L. N., **Ionosfera i ee znachenie dlia radiosviazi.** [Ionosphere and its importance in radio communication.] *Meteorologiia i Gidrologiia*, No. 2:57–58, March/April **1955. DLC**—In this brief note the author describes the composition and characteristics of the ionosphere, the study of the ionosphere by the analysis of radio signal, the characteristics of the various ionospheric layers and their relationship to radio propagation. *Subject Headings:* **1. Ionospheric composition 2. Radio communication.**—*I.L.D.*

6.8–141 551.510.535

*France. Service de Prévision Ionosphérique Militaire, **Observations ionosphériques.** [Ionospheric observations.] Its *SPIM-O*, No. 1, July **1946–** Latest issue received, No. 75, April 1953. mostly tables. **DWB**—The SPIM-O series gives detailed hourly results for the ionospheric characteristics reported from the stations at Dakar, Tananarive and Djibouti. *Subject Headings:* **1. Ionospheric data 2. French Africa.**—*A.A.*

6.8–142 551.510.535:550.385

Fukushima, Naoshi and Oguti, Takasi (*Geoph. Inst., Tokyo Univ.*), **Polar magnetic storms and geomagnetic bays, Appendix 1, A theory of S_D-field.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere in Japan*, 7(4):137–146, Dec. **1953.** 4 figs., 14 refs., 14 eqs. **DWB**—In the current-system for the S_D-field deduced from actual analysis of geomagnetic data, the polar parallel current flows in the approximate direction of a 7.5 h meridian, while the mode of current flow in lower latitudes is almost coincident with CHAPMAN's idealized S_D current system. From the standpoint of the dynamo theory the ionospheric condition that the ratio of integrated value of σ_2 to that of σ_1 is $\frac{1}{2}\sim 1$, gives rise to a satisfactory mode of current flow in the polar and middle latitude regions in the calculated S_D current system. The above ionospheric condition suggests that the current system will be situated lower than 150 km in height. *Subject Headings:* **1. Ionospheric disturbances 2. Magnetic storms.**—*Authors' abstract.*

6.8–143 551.510.535:551.594.12:550.38

Fukushima, Naoshi, **Seasonal variation of ionospheric disturbance.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 8(1):17–18, March **1954.** fig. Discussion p. 18. **DWB**—Ionospheric data of Kokubunji, Japan (1947–49) and Watheroo, Australia are compared with magnetic data for Kakioka, Japan and Watheroo. The comparison shows (as was found earlier by APPLETON and others) that during magnetic storms maximum electron density in the F_2-layer is reduced in summer and increases in winter. This seasonal relation between F_2 electron density and geomagnetic conditions is attributed to a seasonal change of $D_{st}(foF_2)$. *Subject Headings:* **1. Electron density 2. F2 layer 3. Geomagnetic effects 4. Watheroo, Australia 5. Kakioka, Japan.**—*G.T.*

6.8–144 551.510.535:621.396:523.74

Fuster, Arsenio, **Influencia planetaria en la percepción de la radiación.** [Planetary influence in the perception of radiation.] *Las Ciencias*, Madrid, 19(4):834–840, Oct./Dec. **1954.** 5 figs. **DLC**—An attempt to determine roughly the effect of the incidence of sunspots, eclipses, planetary configurations, etc. on ionospheric or radio propagation phenomena, based on 1946, 1947 and 1948 data, and to explain effects with aid of schematic diagrams. *Subject Headings:* **1. Solar influences 2. Planetary influences 3. Radio wave propagation 4. Ionospheric disturbances.**—*M.R.*

6.8–145 551.510.535:550.38

Geomagnetic and solar data. *Journal of Geophysical Research*, 60(1):105–111, March **1955.** mostly tables. Contents: Veldkamp, J., **International data on magnetic disturbances, third quarter, 1954.** p. 105–107; Waldmeier, M., **Provisional sunspot-numbers for October to December 1954.** p. 108. Campbell, J. B., **Cheltenham three-hour-range indices *K* for October to December 1954.** p. 108; **Principal magnetic storms.** p. 109–111. **DWB.** *Subject Headings:* **1. Geomagnetic data 2. Solar data.**

6.8–146 551.510.535 550

Ghosh, Mrinmayee (*Patna Univ., India*), **Geomagnetic control of the F1 region of the ionosphere.** *Journal of Geophysical Research*, 60(1):115–116, March **1955.** 6 figs., 4 refs. **DWB**—Variations of F_1 and F_2 critical frequencies with geomagnetic latitude for March, June and Dec. 1951 and 1947, respectively, show similarity in behavior of F_1 layer to the known behavior of F_2 layer, both diurnally and latitudinally and with high or low sunspot activity. Both sets of curves show bifurcation centered on geomagnetic equator, though foF_1 curve is much less pronounced than foF_2 curve. High activity years (1947) show more pronounced dip at magnetic equator than low sunspot years (1951). Dip is explained as due to large semi-thickness of layers F_1 and F_2 layers in equatorial region. *Subject Headings:* **1. *fo*F1 variations 2. Appleton dip 3. Geomagnetic latitude effects on F layer.**—*M.R.*

6.8–147 551.510.535:621.396.11

*Gough, M. W., **Some features of V.H.F. tropospheric propagation.** *Institution of Electrical Engineers, London, Proceedings*, Pt. B, 102(1):43–58, Jan. **1955.** 24 figs., 6 tables, 20 refs. Condensed version in: *Institution of Electrical Engineers, London, Journal*, New Series, 1(1): 34–36, Jan. **1955.** 6 figs. **DLC**—Widespread v.h.f. continuous signal-strength measurements made in tropical and Mediterranean regions over the last four years have exemplified and thrown into relief many of the well-known mechanisms of tropospheric propagation. Although these mechanisms are broadly familiar to many engineers and physicists, the practical magnitudes, as exemplified throughout the paper, are perhaps less widely appreciated despite their great importance to the communication engineers. It is the purpose of the paper to present and analyze new v.h.f. data from the sources indicated, so as to show (a) that observed v.h.f. signal patterns are consistent with tropospheric structures known commonly to occur, and (b) that sufficient information is now available to enable the communication engineer to forecast to a useful accuracy the statistical behaviour of projected v.h.f. radio paths in certain parts of the world. *Subject Headings:* **1. Tropospheric propagation 2. Ultrashort wave propagation data.**—*Author's abstract.*

6.8–148 551.510.535:551.590.22

Harnischmacher, Ewald, **Sur une influence lunaire relative à l'ionisation maximum de la couche ionosphérique E.** [Lunar effect on maximum ionization of the ionospheric E layer.] *Académie des Sciences, Paris, Comptes Rendus*, 240(5):553–555, Jan. 31, 1955. 6 refs. **DWB**—Other investigators have demonstrated a lunar effect on several ionospheric characteristics, such as the height of the E and F_2 layers and maximum ionization of the F_2 layer. The author extends these results to the maximum ionization of the E layer. After elimination of several variables (influence of season, solar activity, time of day), a definite lunar component, having an amplitude of 1%, is identified. The variation of this lunar component of maximum E layer ionization is centered around full moon. *Subject Headings:* **1. E layer ionization 2. Lunar influences.**—*G.T.*

6.8–149 551.510.535:621.396

Harwood, J., **Spaced-receiver experiments on radio waves of 19-km wavelength.** *Institution of Electrical Engineers, Proceedings*, Pt. 4, 101(7):183–186, Aug. 1954. 3 figs., 11 refs. **DLC**—The signals from the Post Office sender GBR at Rugby on a frequency of 16 kc/s (wavelength 19 km) were received at a distance of about 100 km at two sites whose distance apart was, on one occasion, 15 km, and on another occasion 40 km. Examination of the fading records of the amplitude of the wave reflected from the ionosphere showed that it consisted of a steady component on which was superimposed a randomly varying component. The correlation between records at two points 15 km apart was about 0.8, and at 40 km was 0.35. The time variations of the random component could have been produced by reflection from scattering centers in the ionosphere which moved with random velocities having an r.m.s. value of about 8 m/s in the line of sight, or which drifted steadily with a velocity of about 100 m/s in a direction predominantly east–west. *Subject Headings:* **1. Ionospheric radio wave propagation 2. Radio fading.**—*Author's abstract.*

6.8–150 551.510.535:621.396.8

Hibberd, F. H., **Ionospheric self-interaction of radio waves.** *Journal of Atmospheric and Terrestrial Physics*, 6(5):268–279, May 1955. fig., 12 refs., 28 eqs. **DWB**—A theory is developed for the self-interaction of a modulated continuous wave in the ionosphere. In general, self-interaction will result in a reduction of modulation of a modulated wave and in the generation of harmonics of the original modulation frequency in its passage through the ionosphere. The effects should be greatest for a high-power, medium- to low-frequency wave with low modulation frequency. The magnitude of the demodulation appears to be sufficiently large to measure. It is possible to determine from it the electron collision frequency in the lower E layer. Effects near the gyro-frequency have not been considered. *Subject Heading:* **1. Ionospheric cross modulation.**—*Author's abstract.*

6.8–151 551.510.535:535.6

Hibbard, F. H. (*Dept. of Physics, Univ. of Sydney, Australia*), **Theoretical resonance curves in the gyro-interaction of electromagnetic waves in the ionosphere.** *Il Nuovo Cimento*, 10(4):380–385, April 1, 1953. 2 figs., foot-refs. Italian summary p. 385. **DLC**—In a recent communication DR. MOTZO has considered the gyro-interaction of radio waves in the ionosphere when the disturbing wave is incident vertically. She concludes that for this case one would expect to observe always a single maximum in the index of interaction as the frequency of the disturbing wave is varied through the gyro-frequency. It is possible to show that with larger approximations in the calculations either single or double maxima may occur and that there is little difference in the general shape of the resonance curves resulting from vertically incident and obliquely incident disturbing waves. A qualitative outline is given of the theory of gyro-interaction of V. A. BAILEY. *Subject Headings:* **1. Electromagnetic waves 2. Ionosphere.** —*Author's abstract.*

6.8–152 551.510.535:621.396

Hines, C. O. (*Fitzwilliam House, Cambridge, Eng.*), **Higher-order approximations in ionospheric wave propagation.** *Journal of Geophysical Research*, 58(1):95–98, March 1953. 9 eqs. **DWB**—Because of non-linearities in the basic equations governing ionospheric wave

propagation, the usual (perturbation) treatment involving a single frequency of oscillation does not provide a complete solution. The difficulty has been treated in the literature by the introduction of harmonics but, because of a misinterpretation of the mathematical symbolism, the results are not immediately applicable to the physical problem for which they were intended. A corresponding treatment, physically more appropriate, is undertaken here. Certain results of the earlier inquiry—in particular, those concerning resonance—are regained at some levels of approximation, but the general validity of the approach is found to be doubtful. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric propagation.**—*Author's abstract.*

6.8–153 551.510.535:551.594.12:551.507.362

Johnson, Charles Y. and Meadows, Edith (*both Naval Research Laboratory, Wash., D. C.*), **First investigation of ambient positive-ion composition to 219 km by rocket-borne spectrometer.** *Journal of Geophysical Research*, Wash., D. C., 60(2):193–203, June **1955.** 5 figs., table, 8 refs., 2 eqs. **DWB**—The ambient positive-ion composition of the upper atmosphere in the range 8 to 49 atomic mass units (AMU) was measured between 93 and 219 km by means of a Bennett radio-frequency mass spectrometer. The experiment was flown in the Navy Viking 10 rocket, launched from White Sands Proving Ground, Las Cruces, New Mexico, at 10^h00^m MST, May 7, 1954. The most prominent ion peaks found between 93 and 124 km on the ascent were at 16, 26, 30, and 32 AMU. Other less prominent peaks occurred at 12, 18, 19, 21, 23, 38, and 45 AMU. From 124 to 219 km, ions of 16 and 32 AMU persisted. The results of this investigation are to be considered preliminary and need further verification, not only because the data were obtained from only one flight, but also because of complications introduced by a charge acquired by the rocket and by the evolution of gas from the rocket. *Subject Headings:* **1. Ion composition of upper atmosphere 2. Rocket-borne spectrometers.** —*Authors' abstract.*

6.8–154 551.510.535

Kamiyama, Hiroshi (*Geophysical Inst., Tohoku Univ.*), **The distribution of the ionospheric disturbances during the geomagnetic bay.** *Japan. Science Council. Ionosphere Research Committee. Report of Ionosphere in Japan*, 7(2):70–71, June **1953. DWB**—Using ionospheric data from 35 stations to analyze the distribution of the deviation in foF_2 during the geomagnetic bay, the author found that at comparatively high altitude electric density increased in the afternoon but decreased considerably at sunset. In the middle latitudes the semi-diurnal system of deviations is noticeable. At low latitude, near the magnetic equator, the negative deviations occur in the afternoon in contrast to the stations at high latitudes. The percentage deviations are calculated by means of a diagram. *Subject Headings:* **1. Ionospheric disturbances 2. *fo*F2 distribution 3. Geomagnetism.**—*I.L.D.*

6.8–155 551.510.535:550.385

Kamiyama, Hiroshi, **Disturbances in the ionosphere during the geomagnetic storm of Apr. 18, 1951.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 8(1):32–34, March **1954.** 5 figs. Discussion p. 34. **DWB**—World-wide ionospheric data (virtual height and electron density) are graphically analyzed in connection with a magnetogram obtained at Kakioka Observatory during a geomagnetic storm. Almost simultaneous ionospheric disturbances are identified for all of the 19 stations used. *Subject Headings:* **1. Ionospheric disturbances 2. Magnetic storms.**—*G.T.*

6.8–156 551.510.535:621.396.812

*Kelso, J. M. (*Pa. St. Coll. Ionos. Res. Lab.*), **Magneto-ionic calculations for 150 kilocycles/Sec.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report No. 24, July 20, **1951.** 13 p. tables, graphs, 13 figs. **DWB**—The extensive numerical calculations of the index of refraction, the absorption index and polarization at 150 kc/s are presented, with a brief discussion of the results. The equations used are briefly discussed and the use of the IBM card calculator is considered. As a visual aid in the discussion of the numerical values, four three-dimensional

models were constructed by tracing each μ and x curve onto a cardboard and cutting along the respective curves. The models are shown in a photo. *Subject Headings:* **1. Refraction of radio waves 2. Polarization of radio waves.**—*W.N.*

6.8–157 551.510.535:551.594.7

Kilpatrick, E. L., **A technique for sweep frequency polarization measurements at low frequencies.** *Journal of Geophysical Research*, 59(3):346–349, Sept. **1954.** 3 figs., 3 refs. **MH-BH** Polar and phase diagrams of each sweep frequency ionospheric echo were recorded on photographic film with displacement proportional to virtual height in one direction and to frequency in the other. A block diagram of the equipment is explained and some sample records are shown. Contaminating signals are eliminated by automatic darkening of the screen. *Subject Headings:* **1. Ionospheric echoes 2. Polarization measurements.**—*A.A.*

6.8–158 551.510.535:551.594.12

Kim, Chong Chol and Dickerman, Charles (*Iowa State Univ., Physics Dept.*), **On the analysis of experimental recombinance data using a non-uniform recombinance model proposed by Chapman.** *Journal of Geophysical Research*, Wash., D. C., 60(2):229–230, June **1955.** 2 figs., table. **DWB** Graph shows results of fitting $\alpha=\alpha_0(1+e^{-cz})$ (where α_0 and c are positive constants and z is height measured in units of scale height from a recombinance datum level and α is the recombinance) to the experimental recombinance values of MITRA and JONES for 65–110 km. Graphs and table show values of maximum electron density for various zenith angles of sun (0–89°) for three values of z_0 (0, 1 and −1) using CHAPMAN's non-uniform recombination model. *Subject Headings:* **1. Recombinance models 2. Electron density in E-layer. I. Chapman, Sydney.**—*M.R.*

6.8–159 551.510.535:523.75

Kimpara, Atsushi (*Nagoya Univ.*), **S.I.D. phenomena on November 22, 1952.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere in Japan*, 7(4):158, Dec. **1953. DWB** Brief note reporting S.I.D. phenomenon at time of low solar activity, revealing close correlation of solar flares with outburst of solar radio waves. Atmospherics were found to increase an hour before the solar flare. *Subject Headings:* **1. Ionospheric disturbances 2. Solar flares.**—*G.T.*

6.8–160 551.510.535:535.51:621.396.8

Landmark, Bjorn, **Measurements of limiting polarization of radio waves reflected from the F-layer.** *Journal of Atmospheric and Terrestrial Physics*, 6(5):284–286, May **1955.** 2 figs., table, 5 refs. **DWB** The radius vector, vector angle and axis ratio of *F*-echoes were recorded at Kjeller, Oslo, to test MORGAN's observation that echoes become nearly linearly polarized when the critical frequency is approached. No correlation was found between magnitude of group retardation and state of polarization. The axis ratio was 0.8 to 1.0 compared with Morgan's 0.1–0.2. *Subject Heading:* **1. Ionospheric radio wave propagation.**—*C.E.P.B.*

6.8–161 551.510.535:621.396.11

Lange-Hesse, Günther (*Göttingen*), **Vergleich der Doppelbrechung im Kristall und in der Ionosphäre.** [Comparison of the double refraction in crystals and in the ionosphere.] *Archiv der Elektrischen Übertragung*, Wiesbaden, 6(4):149–158, April **1952.** 8 figs., 14 refs., 44 eqs. **DLC** The double refraction of light by crystals and of electromagnetic waves in the ionosphere show analogous features from a formal point of view. The geomagnetic field produces electrical anisotropy in the ionosphere. The dielectric constants of the ionosphere are derived. The causes for the difference between double refraction phenomena in both media are discussed in detail. The formal mathematical discussion is compared with observation results. Polarization is briefly discussed. *Subject Headings:* **1. Ionosphere 2. Refraction of light 3. Refraction of electromagnetic waves.**—*A.A.*

6.8–162 551.510.535:551.507.362

Lien, J. R.; Marcou, R. J.; Ulwick, J. C.; Aarons, J. and McMorrow, D. R., **Ionosphere research with rocket-borne instruments.** (In: Boyd, R. L. F.; Seaton, M. J. and Massey,

H. S. W. (*eds.*), **Rocket exploration of the upper atmosphere.** London, Pergamon, **1954.** p. 223–239. 17 figs., table, 14 refs., 6 eqs.) **DWB**—Measurements of effective electron density, collisional frequency, and propagation modes over a long path has been made by a series of U.S.A.F. rocket flights at White Sands Proving Ground and Holloman Air Development Center, New Mexico. Data on effective electron density have been obtained by measuring the retardation time of a radio signal a megacycle or so above the critical frequency for the E region. The retardation times were found by comparing the time of arrival in the rocket of two synchronized signals sent from the ground, one of which is the probing signal and the other an ultra-high frequency reference signal that suffers negligible retardation. On several occasions a profile curve relating the effective electron density vs. altitude has been obtained for the regions between 90 and 130 km. These data show the E region to be bifurcated with a separation between layers of about 15 km. This gives support to the view that at least two ionization processes exist within the E region. Some knowledge has been gained of the possible modes of propagation over a long path. Pulsed signals sent from the National Bureau of Standards transmitter at Sterling, Virginia, are received both on the ground and in the rocket near the White Sands region, New Mexico. The signals received in the rocket are retransmitted to the ground, where they are recorded together with the ground received signals. It has been possible to follow the variations in propagation modes as the rocket makes its ascent. In order to obtain a more precise determination of the collisional frequency in the lower E region, a rocket experiment is proposed using the "Luxembourg" or cross modulation phenomenon. The experiment yields the product Gv with respect to altitude. When combined with the "retardation" experiment, it is possible, in principle, to obtain the factor G itself. *Subject Headings:* **1. Ionospheric research 2. Electron density 3. Radio wave propagation 4. Rocket investigations 5. New Mexico 6. Virginia.**—*Authors' abstract.*

6.8–163 551.510.535

Major, G., **D-layer ionospheric echoes at Macquarie Island.** *Nature*, London, 175(4463): 862–863, May 14, **1955.** 2 refs. **DWB**—Echoes at a minimum virtual height of 40 km were observed on most days of the year on 2–7.5 Mc/s at Macquarie Is., occasionally persisting through the night. They may be peculiar to islands. *Subject Headings:* **1. D-layer 2. Macquarie Island.**—*C.E.P.B.*

6.8–164 551.510.535

Martyn, D. F. (*Radio Research Board, Australia*), **The morphology of ionospheric disturbances in the F_2 region.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 8(1):11–15, March **1954.** 2 figs., 6 refs. Discussion p. 15–16. **DWB**—Early and recent results obtained by British and Australian investigators regarding disturbances in the F_2 region are reviewed in brief chapters on $D_{st}(F_2)$ variations, $S_D(F_2)$ variations, effect of local time on commencement and theory of F_2 storms. *Subject Headings:* **1. Ionospheric disturbances 2. F2 region.**—*G.T.*

6.8–165 551.510.535(08)

Martyn, D. F., **[Symposium on] the dynamic characteristics of the ionosphere.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 12:60–99, **1952.** figs., refs. **DWB**—After considering what would happen if there were no magnetic field in the atmosphere and what happens, or what difference occurs, when there is a magnetic field present, various aspects of tidal phenomena, the wind motion in the E region (using meteoric technique) and, finally, the movements of the sporadic E layer were discussed. *Subject Headings:* **1. Ionospheric structure 2. Magnetic fields 3. Symposia.**—*W.N.*

6.8–166 551.510.53

Martyn, D. F., **Upper atmosphere research. The Academy of Science Upper Atmosphere Research Committee.** *Australian Journal of Science*, 16(6):230, June **1954.** **DWB**—Note on establishment of Research Committee which in close cooperation with the Gassiot Committee of the Royal Society will conduct measurements in the upper atmosphere probably by rockets brought up by balloons into levels of lower aerodynamic resistance. A program

is presented with emphasis on the study of the solar spectrum at great heights. *Subject Headings:* **1. Upper atmosphere research 2. Rocket measurement 3. Australia. I. Australia. Upper Atmosphere Research Committee.**—*A.A.*

6.8–167 551.510.535:551.543

Matsushita, Sadami (*Geoph. Inst., Kyoto Univ.*), **Lunar tidal variations in the sporadic-E region.** *Japan. Science Council. Ionosphere Research Committee. Report of Ionosphere in Japan*, 7(2):45–52, **1953.** 7 figs., 2 tables, 12 refs. **DWB**—"Results of statistical studies of Es data may be considered as giving reliable semidiurnal lunar tides in the Es region. The maximum amplitudes of the lunar semidiurnal variations of *f* Es, for a period of one year, resembles that of the F_2 and in *summer* it is larger than that of the F_2, especially in the middle latitudes. The magnitude of the height variation in the tide resembles that of the F_1. The maximum of the height variation occurs approximately 6 hours after the lunar mutations" and the maximum for *f* Es two or three hours later. These phenomena may possibly be explained by the drift movements with horizontal tidal waves. *Subject Headings:* **1. lunar ionospheric tides 2. Sporadic E layer.**—*Based on author's abstract.*

6.8–168 551.510.535:550.385

Matsushita, Sadami (*Kyoto Univ.*), **Some studies of the ionospheric storm.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere in Japan*, 7(4):161–163, Dec. **1953.** 2 tables. **DWB**—Data on E_S-layer variations during magnetic storms in summer solstice are presented for Kokubunji (1949–1952), Brisbane (1949–1952) and Huancayo (1951–1952). It appears that at Huancayo ionospheric variations occur at an earlier time than at other latitudes. A theoretical explanation for this phenomenon is found in an analysis of drift motion of the S_D current system. *Subject Headings:* **1. Ionospheric variations 2. Sporadic E layer 3. Magnetic storms.**—*G.T.*

6.8–169 551.510.535

Menzel, Donald H. and Wolbach, John G., **Variations of the E-layer.** Harvard Univ. Harvard College Observatory. Solar Dept., Contract AF 19(604)-146, Scientific Report, No. 19, Aug. 12, **1954.** 4 p. eqs. **MH-BH**—The parameters E_0 (critical E layer frequency for zenithal sun) and p (a function of the temperature gradient) in the relation $E = E_0 (\cos \chi)^p$ were determined for all available stations in the Northern and Southern Hemisphere over the period 1943 to 1953. The effects of latitude, season and phase of sunspot cycle were derived. p varies between 0.27 and 0.30. *Subject Headings:* **1. E layer variations 2. E layer critical frequencies 3. Northern Hemisphere 4. Southern Hemisphere.**—*A.A.*

6.8–170 551.510.535:621.396:551.590.22

*Mitra, A. P., **Lunar semi-diurnal oscillation in the ionospheric absorption of 150 Kc/s radio waves.** Pennsylvania. State Univ. Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 65, July 1, **1954.** 33 p. 6 tables, 6 figs., 18 refs. **DWB**—Examination of the ionospheric absorption data 150 kc/s, measured at the Pennsylvania State University over the period February 1950 through December 1951, reveals significant lunar semi-diurnal oscillation components. The daytime observations, which refer to the D region, show an oscillation of the type: $0.05 \sin (2t' + 160°)$ neper. The nighttime observations, which refer principally to the E region, show an oscillation given by $0.025 \sin (2t' + 260°)$ neper. Pronounced variation of both the daytime and the nighttime absorption values with lunar age is observed. In both cases maximum absorption occurs about four days after new and full moon. The significance of these results in the study of atmospheric oscillations and of the electrodynamical motions of electrons and ions in Region D and E is discussed. *Subject Headings:* **1. Ionospheric absorption 2. Radio wave propagation 3. Lunar influences.**—*Author's abstract.*

6.8–171 551.510.535:550.385

Miya, Kenichi, **Characteristics of ionospheric disturbance during a severe magnetic storm.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 8(1):35–38, March **1954.** 3 figs. Discussion p. 38. **DWB**—Ionospheric

data from 40 stations of world-wide distribution are analyzed in conjunction with the geomagnetic storm of May 9, 1948 (a simple storm with no multiple outbursts) with the purpose of determining the development in time and space of ionospheric disturbances. The ionospheric disturbance appears to originate in high latitudes and spread to lower latitudes growing in area and attaining maximum development approximately 15 hours after SC. The approximate velocity of propagation of the disturbance is greater in the higher latitudes. *Subject Headings:* **1. Ionospheric disturbances 2. Latitudinal ionospheric variations 3. Magnetic storms.**—*G.T.*

6.8–172 551.510.535:621.396.11:523.3

Murray, W. A. S. and Hargreaves, J. K., **Lunar radio echoes and the Faraday effect in the ionosphere.** *Nature*, London, 173(4411):944–945, May 15, **1954.** 2 figs., 2 refs., eq. **DLC**—Observations on 120 Mc/sec at Jodrell Bank show that long period (about 60 min) fading of echoes from the moon is due to rotation of polarization. This is attributed to change of mean electron density in the ionosphere. *Subject Heading:* **1. Lunar radio reflection.** —*C.E.P.B.*

6.8–173 551.510.535

Nagata, Takesi, **Ionospheric storms in high latitudes.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 8(1):39–44, March **1954.** 3 figs., 12 eqs. Discussion p. 44. **DWB**—In connection with characteristics of foF_2 disturbances as derived from ionospheric data obtained in College, Alaska, the author advances a theory of ionospheric disturbances in high latitudes. The theory is based on the assumption of an expansion of the F_2 layer due to temperature increase caused by an impinging corpuscular stream. In the discussion MARTYN rejects this theory and outlines his own interpretation of ionospheric disturbances, which is applicable to all latitudes and not only to the auroral zone like NAGATA's theory. *Subject Heading:* **1. Ionospheric disturbance theory.**—*G.T.*

6.8–174 551.510.535:551.590.24

Nakata, Yoshiaki, **Ionospheric observation during the partial solar eclipse of February 14, 1953.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere in Japan*, 7(4):157–158, Dec. **1953. DWB**—General results of ionospheric measurements made during a solar eclipse on Feb. 14, 1953 are reported. Minimum values of E_1, F_1 and F_2 critical frequencies preceded the maximum of the eclipse. A marked parallelism was observed between critical frequency of abnormal E layer and relative intensity on 200 Mc/s (taking account of solar zenith angle). *Subject Headings:* **1. E layer critical frequencies 2. Solar eclipse effects.** —*G.T.*

6.8–175 551.510.535

Nakata, Yoshiaki; Kan, Miyao and Uyeda, Hiroyuki, **Simultaneous measurement of sweep frequency h't and fct of the ionosphere.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere in Japan*, 7(4):129–135, Dec. **1953.** 6 figs., 3 refs., eq. **DWB**—This paper deals with simultaneous continuous recording of virtual height and critical frequency of the ionosphere, by changing the frequency in the band from 4.9 to 9.0 Mc/s. The adopted equipment is briefly described. Sample records are presented. *Subject Headings:* **1. Ionosphere critical frequencies 2. Sweep frequency measurement.**—*Authors' abstract.*

6.8–176 551.510.535:551.594.7

A new kind of propagation at very high frequencies. *Franklin Institute, Philadelphia, Journal*, 254(5):417–420, Nov. **1952. DWB**—A theory on tropospheric scattering by BOOKER and GORDON initiated the experimental transmissions at 498 Mc/s that started on Jan. 23, 1951 from Cedar Rapids, Iowa over the 774 mile path to National Bureau of Standard's receivers at Sterling, Va., for the purpose of establishing the diurnal and seasonal characteristics as well as the behavior of the signal during ionospheric disturbances. The experimental results strongly indicate that the signal returns from the E region below level of maximum

ionization, perhaps from below the absorbing region (D region). *Subject Headings:* **1. Radio wave propagation 2. Ionospheric scattering 3. Tropospheric propagation.**—*W.N.*

6.8–177 551.510.535:550.38

Obayashi, Tatsuzo, **On the development of ionospheric storm.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 8(1):19–27, March **1954.** 6 figs., table, 6 refs. **DWB**—Using ionospheric data from all over the Northern Hemisphere the author presents 2 series of 16 Northern Hemisphere charts representing successive stages of development of geomagnetic and ionospheric storms, which took place on Nov. 4–5, 1950. He derives general conclusions regarding the connection between the phases of geomagnetic and ionospheric storms. *Subject Headings:* **1. Ionospheric storms 2. Magnetic storms.**—*G.T.*

6.8–178 551.510.535:551.508.96

Parkinson, R. W. (*Ionosph. Res. Lab., Penna State Univ.*), **Instrumentation for the continuous measurement of certain ionospheric echo characteristics.** *Review of Scientific Instruments*, N. Y., 26(4):319–323, April **1955.** 5 figs., 11 refs., 4 eqs. **DLC**—A method is described for continuously measuring the polarization and other parameters of radio pulse echoes reflected from the ionosphere in very compact form. Time-varied intensity modulation is employed to resolve split echoes with respect to height of reflection. *Subject Headings:* **1. Ionospheric echoes 2. Ionospheric height determination.**—*Author's abstract.*

6.8–179 551.510.535:621.396

Parkinson, R. W., **Second-order wave solutions for critical and near-critical coupling conditions.** Pennsylvania. State Univ. Ionosphere Research Laboratory, Contract AF 19(122)-44, Ionosphere Research, Scientific Report, No. 70, Oct. 1, **1954.** 61 p. 34 figs., table, 9 eqs. **MH-BH**—Explicit expressions for second-order wave solutions of the general equations of propagation are obtained. Numerical results are included for six ionospheric models chosen to provide critical and near-critical coupling conditions. It is concluded that the theoretical results show excellent promise of explaining experimentally observed coupling phenomena; correlation of theory with experiment, now under way, is deferred to a future report. *Subject Headings:* **1. Ionospheric coupling 2. Radio wave propagation.**—*Author's abstract.*

6.8–180 551.510.535

Rawer, Karl and Argence, Emile, **Sur les phénomènes de focalisation dus à la houle ionosphérique et la détermination du nombre de chocs.** [Focalization phenomena caused by ionospheric tides, and determination of the number of collisions.] *Académie des Sciences, Paris, Comptes Rendus*, 239(17):1066–1067, Oct. 27, **1954.** 6 refs. **DWB**—Certain ionospheric phenomena (like a secondary echo having larger amplitude than the primary one) cannot be explained by the customary hypothesis of a plane stratified ionosphere. Such phenomena may be accounted for by the assumption of a wave motion of the reflecting surface. The author presents an equation for deriving ionospheric curvature from amplitudes of triple echoes. The new approach considerably affects various values deduced from ionospheric measurements. *Subject Headings:* **1. Collisional frequencies 2. Ionospheric echoes.**—*G.T.*

6.8–181 551.510.535

*†Rydbeck, Olof E. H., **Theoretical survey of the possibilities of determining the distribution of the free electrons in the upper atmosphere.** *Göteborg, Sweden. Chalmers Tekniska Hogskola, Handlingar*, No. 3, **1942.** 74 p. 37 figs., tables, 20 refs., 99 eqs. **DWB**—The general theory of radio wave propagation in ionosphere is reviewed and then the special problems of 1), propagation of the wave train, 2), the dispersion of the returning (downward directed) radio echoes, 3), phase relations of the virtual path-length, 4), calculation of the true height of reflection and the true electron density distribution, 5), calculation of variation of collisional frequency with height, 6), typical electron density distributions (Huancayo and Cambridge, Mass.), 7), the exact wave functions for a parabolic layer. *Subject Headings:* **1. Ionospheric propagation 2. Electron distribution 3. Collisional frequencies.**—*M.R.*

6.8–182 551.510.535:621.396.1:550.38

Schumann, W. O., **Über die Beeinflüssung der Ausbreitung sehr langer elektrischer Wellen durch das Magnetfeld der Erde.** [Influencing of propagation of very long electric waves by the geomagnetic field.] *Naturwissenschaften*, 42(4):91–92, Feb. **1955.** 2 refs. **DWB**—Under the influence of a vertical magnetic field the ionosphere becomes an anisotropic conductor and a wave of very low frequency splits into two coupled waves. This effect and its avoidance are discussed. *Subject Headings:* **1. Radio wave propagation 2. Geomagnetic effects.**—*C.E.P.B.*

6.8–183 551.510.535:621.396 551.501.83

Schumann, Winfried Otto, **Über die Oberfelder bei der Ausbreitung langer elektrischer Wellen im System Erde-Luft-Ionosphäre und 2 Anwendungen (horizontaler und senkrechter Dipol).** [On "modes" in the propagation of long electric waves in the earth-air-ionosphere system and two applications (horizontal and vertical dipole).] *Zeitschrift für Angewandte Physik*, Berlin, 6(1):35–43, **1954.** 2 figs., 14 refs., 39 eqs. **DLC**—It is shown that the earth's curvature may be disregarded when determining "modes" of electric waves in the kilometer range, thereby replacing radial Bessel functions by exponential distributions. Propagation properties and emission intensities of such modes are determined for the electrical and magnetic vertical dipoles according to the method of singular characteristic functions. The propagation of thunderstorm sferics is also discussed. *Subject Headings:* **1. Radio wave propagation 2. Sferics.**—*Trans. of author's abstract.*

6.8–184 551.510.535

Scott, James C. W., **The distribution of F_2 region ionization at high latitudes.** *Journal of Atmospheric and Terrestrial Physics*, 3(6):289–294, July **1953.** 7 figs. Also in: *International Council of Scientific Unions. Mixed Commission on the Ionosphere, 3rd meeting, Canberra, Australia, Aug. 1952, Proceedings*, pub. **1953.** p. 159–167. 5 figs. English and French summaries p. 167. **DWB**—Values of foF_2 at Churchill at different sunspot numbers S are represented by $a+bS$. Values of a and b are extrapolated to 30°N and polar charts are constructed to show their distribution in Jan. and June at different hours. These charts are discussed to show effects of darkness, season, and of auroral zone. *Subject Headings:* **1. Ionospheric ionization 2. Solar activity 3. Churchill, Canadian Arctic.**—*M.R.*

6.8–185 551.510.535:551.594.12

Seddon, Carl J. (*U. S. Naval Research Lab., Wash., D. C.*), **Electron densities in the ionosphere.** *Journal of Geophysical Research*, 59(4):463–466, Dec. **1954.** 4 figs. **MH-BH**—Recently the author published a curve of electron densities obtained from rocket experiments. The published curve showed a sharp decrease in electron density at 145 km. Another interpretation of the data eliminates this decrease. The new interpretation is based on a breakdown in independence of propagation of the magneto-ionic components of a CW-signal transmitted from the flying rocket. The downgoing extraordinary ray was transformed into an ordinary ray at an electron density corresponding to approximately the critical frequency for the ordinary ray. The newly-deduced electron-density curve is in excellent agreement with the *P'-f* records taken simultaneously. The F_1 "layer" is merely a low-gradient shelf between 140 and 149 km. A small portion of the steep gradient of the F_2 layer is observable at 150 km. A composite graph of all rocket results above 90 km is shown. The only common feature observable in the rocket data when sporadic *E* appeared on the *P'-f* records was a steep electron-density gradient near the peak electron density of the *E* layer. *Subject Headings:* **1. Electron density 2. Rocket investigations.**—*Author's abstract.*

6.8–186 551.510.535:550.385

Sinno, Kenzi, **On the characteristics of F_2 layer variations associated with geomagnetic storms.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 8(1):28–31, March **1954.** 3 figs., 3 refs. Discussion p. 31. **DWB**—Average data on foF_2 disturbances are graphically presented. The original data were from a world-wide selection of stations (1949–1951) and from Washington (1944–1951) for the ionospheric data and from Kakioka for magnetic data. The author concludes that "iono-

spheric F_2 disturbance phenomena may be secondary effects of the magnetic ones, e.g., electromagnetic drift to levels of different recombination coefficient due to current flow in the upper atmosphere." *Subject Headings:* **1. F2 layer variations 2. *fo*F2 disturbances 3. Magnetic effects.**—*G.T.*

6.8–187 551.510.535:621.396.8:523.74

Theissen, E., **L'influence du cycle solaire sur le facteur de transmission (M3000)F2.** [The influence of the solar cycle on the factor of transmission.] *Journal of Atmospheric and Terrestrial Physics*, 6(5):243–249, May **1955.** 6 figs., table, 11 refs., 8 eqs. English summary p. 243. **DWB**—The diurnal and annual variation of the transmission factor at Huancayo is shown at maximum and minimum solar activity. A number of other stations were examined, the values of *M* plotted and the world-wide variation shown as a function of time of day. *Subject Headings:* **1. Ionospheric attenuation 2. Solar activity.**—*C.E.P.B.*

6.8–188 55.510.535

Toman, Kurt (*Cruft Lab., Harvard Univ.*), **Movement of the F-region.** *Journal of Geophysical Research*, 60(1):57–70, March **1955.** 19 figs., 10 refs., 3 eqs. **DWB**—In the course of a fixed-frequency ionospheric study, employing a pulse-triggered transmitter operating on 3.5 Mc/s and three spaced-receivers, the transmission delay was continuously recorded. Aside from a vertical-incidence transmission, two oblique transmissions were thus available with 62 and 109 km as base lines, the latter being correspondingly oriented in an approximate west-east and northwest-southwest direction. An analysis of the echoes from the *F* region was made for the period between August 1952 and December 1953. Successive irregularities observed simultaneously on three records displayed frequently consistent time-displacements. Assuming the midpoints of the transmissions to be characteristic and preferred areas for the reflection of the h.f.-pulses, the time-displacements were interpreted as being due to a mechanical motion of the F region. Direction and speed of this movement were thus obtained, and semiannual and annual periods of these components became apparent. *Subject Headings:* **1. Ionospheric movements 2. F region.**—*Author's abstract.*

6.8–189 551.510.535:551.506:551.501.9

*U. S. National Bureau of Standards. Central Radio Propagation Laboratory, Boulder Colo., **Ionospheric data.** Its *CRPL-F* 127, March **1955.** 95 p. 156 figs., 106+tables. **DWB**—World wide sources of ionospheric data are listed; tables give hourly data for Wash., D. C., and 49 other places; storms, SID's, radio propagation data, solar coronas, relative sunspot data, solar flares, etc. Also presents data in graphic form for 50 stations throughout world, both observed and predicted 5 months previously for comparative purposes. Date of data varies from Feb.–Dec. 1953 for Macquarie Island to Feb. 1955 for Wash., D. C. *Subject Headings:* **1. Ionospheric data 2. Ionospheric networks.**—*M.R.*

6.8–190 551.510.535:523.74

Uyeda, Hiroyuki, **Ionospheric storms in middle and low latitudes.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 8(1):3–10, March **1954.** 7 figs., table. Discussion p. 8. **DWB**—Recent results obtained in Japan with regard to (1) the morphology of ionospheric storms, (2) development of ionospheric storms and (3) correlation between ionospheric storms and other geophysical phenomena are summed up and illustrated. One of the results reported concerns the discovery of a solar flare effect in the dark hemisphere, appearing in sudden ionospheric and geomagnetic variations, radio noise, and changes in radio-wave intensity. *Subject Headings:* **1. Ionospheric storms 2. Solar flares.**—*G.T.*

6.8–191 551.510.535:551.594.5

Vegard, Lars, **The Doppler displacement of the ionospheric hydrogen lines and its bearing on the auroral theory and solar terrestrial relationships.** *International Council of Scientific Unions. Mixed Commission on the Ionosphere, Third meeting, Canberra, Australia, Aug. 24–26, 1952, Proceedings*, pub. **1953.** p. 135–144. 2 tables, 18 refs., 5 eqs. **DWB**—The author

recapitulates his auroral theory and theory of its agreement with auroral H-line observations. The theory interprets auroral phenomena in terms of the ratio of electrons to protons in bundles of solar corpuscular radiation reaching the ionosphere. Detection of new auroral bands at Tromso is mentioned, bringing the total of auroral bands and lines measured to approximately 520. *Subject Headings:* **1. Auroral theories 2. Ionospheric hydrogen lines 3. Corpuscular radiation 4. Auroral hydrogen lines.**—*G.T.*

6.8–192 551.510.535:621.396.9

Wait, James R. and Froese, Charlotte (*Radio Physics Lab. Defence Res. Board, Ottawa*), **Reflection of a transient electromagnetic wave at a conducting surface.** *Journal of Geophysical Research*, 60(1):97–103, March **1955.** 5 figs., 7 refs., 25 eqs. **DWB**—A solution is given for the reflection of a transient electromagnetic plane wave at oblique incidence from the plane interface of a dissipative medium. The inversion of the Laplace transforms can only be carried out in closed form in special cases. Series solutions are developed for the general case and the numerical results are presented in graphical form. Brief mention is made of the possible application of this solution to the reflection of a radio atmospheric at a sharply bounded ionosphere. *Subject Headings:* **1. Electromagnetic wave reflection 2. Ionospheric reflection.** —*Authors' abstract.*

6.8–193 523.75:551.510.535:621.396.8

Warwick, Constance S. (*Sacramento Peak Station, Harvard College Obs.*), **Some characteristics of solar flares.** *Astrophysical Journal*, 120(2):237–244, Sept. **1954.** 6 tables, 11 refs. **DLC.** Also issued as: Harvard Univ. Harvard College Observatory. Solar Dept., Contract AF 19(604)-146, Scientific Report No. 14, Jan. 22, **1954.** 14 p. 10 tables, 2 figs. **DWB**—A study of the relation of visual solar events such as flares to unusual radio noise at 200 Mc/sec and to fadeouts and SID's. Flare data (and also radio data) are taken from Sacramento Peak records (at 5 min intervals). Between Feb. 28, 1951 and April 4, 1953, 425 flares were observed. Intensities are measured on a scale from 0 to 30, representing range from the normal disk brightness to the most intense flare observed. Subjective and physical errors may creep into such estimations. Eruptive prominences and ejections on the limb are observed visually and photographically. The study revealed no significant correlation between distance from solar limb and intensity or production of noise, nor any asymmetry (E or W limbs) in position of flares which produce noise, fading or SID's. *Subject Headings:* **1. Solar flares 2. Radio noises 3. Radio fading 4. Sudden ionospheric disturbances 5. Sacramento Peak, N. Mexico.**—*M.R.*

6.8–194 551.510.535:533.17

Yerg, Donald G., **The applicability of continuous-fluid theory in the higher atmosphere.** *Journal of Meteorology*, 11(5):387–391, Oct. **1954.** 2 tables, 7 refs., 37 eqs. **DWB**—The "infinitesimal volume" containing sufficient molecules for hydrodynamic calculation by continuous-fluid theory is calculated as edge length 70–0.04 cm at 100 km and 600–3 cm at 400 km; 10 cm is suitable at all heights. Conventional equations of motion may be used confidently in E region; in F region modifications may be required for long mean free path of molecules. (*See item* 6.4–122, April 1955, *MAB*, for abstract of similar article.) *Subject Headings:* **1. Ionospheric movements 2. Equations of motion.**—*C.E.P.B.*

6.8–195 551.510.535:551.557

Yerg, Donald (*College of Agri. and Mechanic Arts, Univ. of Puerto Rico, Mayaguez*), **Notes on correlation methods for evaluating ionospheric winds from radio fading records.** *Journal of Geophysical Research*, Wash., D. C., 60(2):173–185, June **1955.** 3 figs., 2 tables, 9 refs., 39 eqs. **DWB**—A correlation method requiring six values of the correlation coefficient is developed. Expressions for the drift velocity, fading velocity, and characteristic velocity are obtained from a correlation theory extended to include an elliptical contour in the horizontal plane. The physical significance of the derived velocities is considered. Preliminary data indicate that the correlation ellipse exhibits a preferred orientation and that fading associated with random changes is as important as fading associated with a drifting pattern. *Subject Headings:* **1. Ionospheric wind measurement 2. Radio fading.**—*Author's abstract.*

6.8–196 551.510.535:551.557:551.594.7

*Yerg, Donald G., **Notes on the evaluation of ionospheric winds from radio fading records.** Puerto Rico. University. College of Agriculture and Mechanic Arts, Contract AF 19(122)-476, Scientific Report, No. 2, Aug. **1954.** 58 p. 9 figs., 5 tables, 8 refs., eqs. Mimeo. **DWB**—A simplified correlation method has been developed for the evaluation of ionospheric winds from radio fading records. The method involves only six values of the correlation coefficient and is shown to be approximately equivalent to the longer procedure requiring graphs of the auto-correlation and cross-correlation functions. The method also allows for the assumption of an ellipse for the correlation contours in the horizontal planes. The drift velocity, fading velocity, and characteristic velocity are evaluated for this theory extended to include elliptical contours. The physical origins and implications of the derived velocities are studied. It is shown that the application of the correlation method requires that the interference pattern be unchanging and drifting in the direction of the wind with twice the speed of the wind. The correlation ellipse is representative of the shape and orientation of the interference pattern only if the random fluctuations are independent of direction. Preliminary data suggest that the random fluctuations are associated with a possible geomagnetic or geographic control and are not isotropic. Data also indicate that it is not possible to determine the validity of the method of similar fades by visual inspection of the records. Turbulence was an important factor in all the fading records obtained. *Subject Headings:* **1. Ionospheric winds 2. Radio fading records 3. Correlation coefficients.**—*Author's abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Cyclogenesis** (Dean), 6.8–209; **Heat budget of water** (Jung, Gilcrest), 6.8–243.

6.8–197 551.511:551.551

†Kohlsche, Kurt (*Potsdam, Inst. of Weather Research*), **Betrachtungen zum Austausch-problem unter besonderer Berücksichtigung des Vertikalaustausches.** [Consideration of the "Austausch" problem with special regard to vertical exchange.] *Zeitschrift für Meteorologie*, Berlin, 8(9):257–275, Sept. **1954.** 22 refs., 105 eqs. **MH-BH**—The turbulent flux T_i of a characteristic is defined as the difference between the mean total flux and the flux of the mean field. T_i can be represented as the sum of three integrals in which the turbulent oscillations of the pressure (f), temperature and velocity appear. For the turbulent oscillations of F and T it is possible to derive expressions which show the nature of their dependence upon velocity oscillations. T_i is reduced to a three term expression if it is assumed that owing to random nature of turbulence no correlations exist between supplementary velocity and other magnitudes. All three members contain as a factor the same tensor ("austausch" tensor) which alone depends upon the supplementary velocities. By applying Fourier series to the supplementary velocities it is shown that the "austausch" tensor is closely associated with the turbulence energy and that long period velocity oscillations produce a greater austausch than short period oscillations. The relationship of the austausch tensor and EXNER's empirical formula for vertical austausch is examined. The examples treated are the vertical currents of mass and of internal and potential energy and the results are compared with those of SCHMIDT and RICHARDSON. *Subject Headings:* **1. Austausch theory 2. Turbulent exchange.** —*Trans. of author's abstract.*

6.8–198 551.511:536.2

Petrou, Léonidas, **Étude de la convection forcée et naturelle dans le cas de fils disposés parallèlement au vent.** [Analysis of forced and natural convection by means of wires parallel to the wind.] *Académie des Sciences, Paris, Comptes Rendus*, 239(19):1187–1189, Nov. 8, **1954.** ref. **DWB**—Empirical formulas are presented, expressing the amount of heat loss from a heated wire in still air and in an air current flowing along the wire. *Subject Headings:* **1. Convection above heated wires 2. Heat loss.**—*G.T.*

6.8–199 551.511:551.558.1

Priestley, C. H. B., **Free and forced convection in the atmosphere near the ground.** *Royal Meteorological Society, Quarterly Journal*, 81(348):139–143, April **1955.** fig., table,

8 refs., 3 eqs. **DWB**—The heat flux through convection is related to the inverse square root of the Richardson number. A series of measurements by W. C. SWINBANK is used to test the theoretical relationship, and it is shown that there is a sharp transition from forced to free convection at $-Ri=0.02-0.04$. *Subject Heading:* **1. Convection.**—*C.E.P.B.*

GENERAL CIRCULATION

See also: **Jet stream problem** (Faust), 6.8–10.

6.8–200 551.513:551.557

*Buch, Hans S. (*Danish Met. Inst.*), **Hemispheric wind conditions during the year 1950.** Massachusetts Institute of Technology. Dept. of Meteorology, Contract AF 19(122)-153, Final Report, Pt. 2, May 31, **1954.** 126 p. 90 plates, 8 tables, 7 refs., eqs. **MH-BH**—A comprehensive study of the statistical properties of the general circulation over the Northern Hemisphere, based on radio and pilot balloon wind data for 1950 (81 stations). Part of data over Asia are lacking. Numerous maps show mean zonal and meridional winds, transport of momentum and their standard deviations, as well as the correlation of zonal and meridional winds for the year, the summer and winter half-year at six standard levels from 850 to 100 mb. Zonal averages are presented in tables and meridional cross-sections. The wind distribution is not normal in most cases, as it was assumed by BROOKS in the first approximation, since definite correlations exist between different directions and the standard deviations from the mean wind depend on the direction. The yearly mean northward flux of angular momentum has a maximum at 30°N with 26×10^{25} gm cm^2 sec^{-1}, reaches zero at about 59°N and is slightly negative polewards of this latitude. *Subject Headings:* **1. General circulation 2. Upper air winds 3. Northern Hemisphere.**—*A.A.*

6.8–201 551.513

Klein, William H. (*U. S. W. B., Wash., D. C.*), **The general circulation of 1954.** *Weatherwise*, 8(1):6–11, Feb. **1955.** 9 figs. **DWB**—A summary of the articles on weather and circulation published by the author in the **Monthly Weather Review** for 1954. A seasonal description of the general circulation accompanied by charts and graphs is presented. *Subjec Heading:* **1. General circulation.**—*I.L.D.*

6.8–202 551.513:551.524.7

*Kochanski, Adam, **Cross sections of the mean zonal flow and temperature along 80°W.** *Journal of Meteorology*, 12(2):95–106, April **1955.** 12 figs., 6 tables, 28 refs. **DWB**—Mean meridional sections for Jan., April, July and Oct. in 80°W were constructed from mean contour maps and data for 17 stations between 8°58′N and 82°59′N from surface to 25 mb (wind) and 10 mb (temperature). The wind sections show the mid-latitude maximum of westerlies on the polar tropopause, often split into two, the subtropical maximum of easterlies (50 kn in July) and the polar-night westerlies changing to easterlies in summer. The annual variation of the polar and tropical tropopauses is shown and a higher one ("tropopause leaf") is introduced in 40–50°N. Above the tropopause in polar regions in winter, temperature continues to decrease, reaching −85°F at 30 km; in summer there is a slight increase. The meridional temperature gradient is reversed between 14 and 26 km from winter to summer; at about 15 km between 0° and 50°N July is colder than Jan. *Subject Headings:* **1. Zonal wind profile 2. Zonal temperature profile 3. Stratosphere.**—*C.E.P.B.*

6.8–203 551.513:551.558.2

Watanabe, T., **Dynamical mechanism on the maintenance of stationary vorticity field.** *Journal of Meteorological Research*, Tokyo, 6(1/3):8–16, March **1954.** 9 figs., table, 2 refs., numerous eqs. In Japanese. English summary p. 8. **MH-BH**—The structure and maintenance of a vorticity field in winter over the North American area were discussed in use of

the stationary vorticity equation. The stationary vorticity equation is as follows:

$$u\frac{\partial Z}{\partial x}+v\frac{\partial Z}{\partial y}+w\frac{\partial \zeta}{\partial z}+ZQ=N, \quad (1)$$

where u, v, w is the wind component, ζ the vertical component of the relative vorticity, Z the vertical component of the absolute vorticity, Q the horizontal divergence and N the solenoidal effect. Next, the stationary continuity equation is as follows:

$$\frac{\partial(\rho U)}{\partial x}+\frac{\partial(\rho V)}{\partial y}+\frac{\partial(\rho W)}{\partial z}=0.$$

If we assume that the horizontal gradient of the air density ρ could be neglected, we have the equation

$$\rho\left(\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}\right)+\frac{\partial(\rho W)}{\partial z}=0$$

or

$$Q=-\frac{1}{\rho}\frac{\partial(\rho W)}{\partial z}. \quad (2)$$

From (1) and (2), we have the differential equation for (ρw)

$$Z\frac{(\partial \rho W)}{\partial z}-(\rho W)\frac{\partial Z}{\partial z}=\rho\left(u\frac{\partial Z}{\partial x}+v\frac{\partial Z}{\partial y}-N\right)$$

and integrating the above equation, we have the relation

$$w=\frac{Z}{\rho}\int_e^z\frac{\rho}{Z^2}\left(u\frac{\partial Z}{\partial x}+v\frac{\partial Z}{\partial y}-N\right)dz. \quad (3)$$

Hence, we can estimate the vertical component of wind w by the monthly mean chart, and then we can study the role of the factor $u\frac{\partial Z}{\partial x}+\frac{\partial Z}{\partial y}$, $w\frac{\partial \zeta}{\partial z}$, ZQ and N for the maintenance of the vorticity field. By the above method, we could conclude that the principal factors for the maintenance of the vorticity field of 500 mb surface, in winter, were $u\frac{\partial Z}{\partial x}+v\frac{\partial Z}{\partial y}$ and $w\frac{\partial \zeta}{\partial z}$, and the factor pointed out by CHARNEY-ELIASSEN was rather smaller than the factor $w\frac{\partial \zeta}{\partial z}$. *Subject Headings:* **1. Vorticity field 2. Atmospheric circulation.**—*Author's abstract.*

6.8–204 551.513.1

Battin, R. H., **On the two-dimensional incompressible flow of an inviscid fluid over the earth.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Paper.*, No. 24:53–78, Nov. **1953.** 15 fig., refs., 51 eqs. *AFCRC Technical Report* 53-35. **DWB, DLC**—The atmosphere is regarded as an inviscid, incompressible fluid moving over a rotating spherical earth with no motion in the vertical direction. In this case the basic relation is that the normal component of the absolute vorticity is invariant, following the motion of each fluid particle. From this an analysis of the propagation of undamped oscillations of finite amplitude is made, and all of the simple solutions of the non-linear vorticity equation are obtained for the spherical earth. The problem of the motion induced by a vortex pair is solved and the flow past a cylindrical mountain is analyzed for various amounts of circulation around the obstruction. Finally, the mathematical analysis of the stability problem and the meridional movement of cyclonic and anticyclonic disturbances is considered. The study is based on a formula giving the acceleration experienced by a fluid element possessing an excess or defect of vorticity over the surrounding fluid. *Subject Headings:* **1. Atmospheric circulation theory. I. Massachusetts Institute of Technology II. Contract AF 19(122)-153.**—*Author's abstract.*

6.8–205 551.513.1:551.524.35

Smith, Kenneth E. (*U. S. W. B., Wash., D. C.*), **The weather and circulation of January 1953.** *Monthly Weather Review*, 81(1):16–19, Jan. **1953.** 6 figs., 2 refs. **MH-BH**—Unusual weather conditions which occurred all over the Northern Hemisphere during Jan. 1953 are described in connection with the mean circulation patterns, position of jet streams, storm tracks, etc. as deduced from 5-day and 30-day mean charts. The month was the warmest Jan. on record in the Northern Rockies and the anomalous warmth covered the whole United States. The storms and floods in the North Sea area at the end of Jan. were also of record breaking proportions. The history of these storms is related in terms of 700 mb mean circulation patterns for the hemisphere. *Subject Headings:* **1. Mild winters 2. Atmospheric circulation 3. Northern Hemisphere.**—*M.R.*

6.8–206 551.513.1:551.515.2(73)

Winston, Jay S. (*U. S. W. B., Wash., D. C.*), **The weather and circulation of August 1954.** *Monthly Weather Review*, 82(8):228–236, Aug. **1954.** 10 figs., 16 refs. **DWB**—In addition to discussing the persistence of the August weather regime, which was basically similar to that prevailing in July and June, and the Aug. circulation pattern over the United States, which "consisted of deeper-than-normal-troughs near each coast and a stronger-than-normal-continental anticyclone dominating the southern half of the country," the author analyzes the course and characteristics of Hurricane "Carol" and the relationship of its behavior to the planetary wave pattern. *Subject Headings:* **1. General circulation 2. Circulation patterns 3. Hurricane "Carol" (1954) 4. United States.**—*I.L.D.*

ATMOSPHERIC DISTURBANCES

See also: **Okla. tornadoes** (Sugg, Foster), 6.8–111; **Typhoon forecasting,** 6.8–119; **Forecasting typhoon of 1949** (6.8–120); **Weather and circulation** (Winston), 6.8–206; **Tornado wind velocity** (Booker), 6.8–264; **Hurricane precip.** (Berg), 6.8–284; **Atomic explosion effects** (Machta, Harris), 6.8–342.

6.8–207 551.515.1:551.515.7(4)

*Evjen, Sigurd, **Number of cyclones and anticyclones in Northwest and Middle Europe.** *Meteorologiske Annaler*, Oslo, 3(16):469–485, **1954.** 10 figs., tables. **DLC**—The area of Northwest and Middle Europe has been divided in 32 "squares" and the number of cyclone and anticyclone centers have been counted within each square. Yearly and monthly means have been computed together with standard deviations and standard errors and the material has been discussed as to yearly variations, geographical distribution, etc. *Subject Headings:* **1. Cyclone frequencies 2. Anticyclone frequencies 3. Europe.**—*Author's abstract.*

6.8–208 551.515.2

Jordan, Charles L. (*Univ. of Chicago*), **The size of tropical cyclones.** *American Meteorological Society, Bulletin*, 36(1):37–38, Jan. **1955.** fig., 5 refs. **MH-BH**—The author stresses the fact "that tropical cyclones may be large or small scale features and that theoretical studies should take cognizance of the large variations in scale." The sizes of various cyclones are discussed and a diagram showing the pressure distribution for the typhoon of Oct. 7, 1945 transferred to a map of the U. S. is presented. *Subject Heading:* **1. Tropical cyclone size.**—*I.L.D.*

6.8–209 551.515.11:551.521

Dean, Gordon A., **The circulation of the lower atmosphere over the Marshall Islands during October 1952.** California. Univ. at L. A., Institute of Geophysics. Oahu Research Center, Contract AF 19(604)-546, Scientific Report No. 5, July **1954.** 8 p. 20 figs., table, 3 refs. **DWB**—During Oct. 1952 both proximal or "warm core" and distal or "cold core" cyclogenesis occurred over the Marshall Islands. In the lower troposphere zones of alternating convergence and divergence were so persistent that this synoptic pattern could be observed on the mean 2000 and 10,000 ft wind analyses. At 2000 ft, streamline convergence appears near 8°–12°N; directional divergence exists near the equator. At 10,000 ft, directional

convergence is near 10°N and directional divergence near 5°–7°N. A weak wave appears in the mean flow at 20,000 ft. The relationships between the upper level cyclones and the wind field is discussed in terms of a model of the type of cyclone found most often in the Marshall Islands. The wind field in the lower stratosphere is considered. *Subject Headings:* **1. Cyclogenesis 2. Convergence 3. Marshall Island.**—*I.L.D.*

6.8–210 551.515.21(265/266)

*§Dean, Gordon A., **Example of tropical cyclogenesis symmetrical with respect to the equator.** California. Univ. Institute of Geophysics. Oahu Research Center, Contract AF 19(604)-546, Scientific Report, No. 3, April 1954. 6 p. 19 figs. (some fold.), table, 5 refs. Appendix A: **Wind tabulation sheets.** Appendix B: **Storm warnings. MH-BH**—Use of more sensitive synoptic analysis techniques, as well as more detailed information and a broader definition of a tropical cyclone has pushed the place of origin of most such storms well to the SE in the Northern Hemisphere and to the NE in the Southern Hemisphere. Just such detailed analysis showed that a cyclone (Joan) which was reported to have crossed the equator and moved toward Guam actually was twin cyclones which moved toward Fiji and Guam, respectively. Voluminous records of upper air winds and numerous surface synoptic and streamline charts, and surface weather data, forecasts, etc. are included for the period April 29–May 7, 1951. *Subject Headings:* **1. Tropical cyclogenesis studies 2. Central Pacific.**—*M.R.*

6.8–211 551.515.11

*Petterssen, Sverre and Bradbury, Dorothy, **An investigation of cyclone development, Storm No. 1.** Chicago University. Dept. of Meteorology, Contract AF 19(604)-390, Technical Report, No. 5, Oct. 1954. 68 p. 21 figs., 16 refs., 32 eqs. **DWB**—A storm with a rapid rate of development is investigated in detail, particularly with a view to discovering predictable sequences of events that precede cyclogenesis at sea level. The vorticity equation is used to compute the vertical motions and the horizontal divergence in and around the storm. An attempt at accounting for the observed thickness changes as a result of horizontal advection and adiabatic (wet and dry) processes is made. The behavior of the level of non-divergence is investigated and an attempt is made to determine to what extent the development at sea level can be accounted for without appeal to adiabatic and non-adiabatic temperature changes. The computed vertical velocities are compared with the observed patterns of precipitation. The following tentative results are foreshadowed. (1) The development of the storms at sea level was preceded by a forward march and intensification of an upper cold trough and commenced at the time when the area of positive vorticity advection in advance of the upper trough became superimposed upon the sea-level frontal zone. (2) The forward march of the upper trough was accompanied by frontogenesis of appreciable intensity. *Subject Headings:* **1. Cyclogenesis 2. Cyclone development 3. Frontogenesis.**—*Authors' abstract.*

6.8–212 551.515.11

§Breistein, P. M., **Investigation of cyclone development, Storm 2.** Chicago Univ. Dept. of Meteorology, Contract AF 19(604)-390, Technical Report, No. 6, Oct. 1954. 19 p. 21 figs., table, eqs. **MH-BH**—A storm with three distinct periods of development (moving on Feb. 17–22, 1953 from the Pacific Northwest into the Great Plains and across the Lakes to Labrador) is analyzed in detail. The vorticity equation and the first law of thermodynamics are used to evaluate pertinent quantities from the synoptic analyses. The following general results were obtained. (A) During the first and the early part of the second period of development the frontal structure was weak, and the major contribution to the development was due to vorticity advection in the upper troposphere. (B) During the second and early part of the third period of development a frontogenesis in depth took place, and the effect of thermal advection became a prominent factor. The distributions of vertical velocity and divergence are investigated and compared with development, rainfall and cloudiness. In general there is good agreement between the patterns of the vertical velocity and weather elements. The first level of non-divergence over the storm center oscillated between 500 and 700 mb. The main compensation in the divergence field was, however, between the upper troposphere and the stratosphere, except after the storm had become strong; after this time a fair measure of

compensation existed between the lower and upper troposphere. *Subject Headings:* **1. Extratopical cyclone theory 2. Cyclogenesis 3. Cyclone development 4. United States.**—*Author's abstract.*

6.8–213 551.515.21

§Simpson, R. H. (*U. S. W. B.*), **Structure of an immature hurricane.** *American Meteorological Society, Bulletin*, 35(8):335–350, Oct. **1954.** 9 figs., 8 photos., 9 refs. **MH-BH**—The circulation in the eye of the hurricane Dolly, Sept. 10, 1953 was explored in order to determine whether a level existed at which a constant level balloon, released in the eye, would be translated with the storm and serve as a marker on the movement of the center. Description of the flight including some of the storm features, the general synoptic situation during the flight, the circulation features in the hurricane, the cloud structure (illustrated with photographs) and the thermal structure are discussed. Synoptic charts and dropsonde data are presented. *Subject Headings:* **1. Cyclone structure 2. Eye of hurricane 3. Hurricane "Dolly" (1953).** —*I.L.D.*

6.8–214 551.515.21

Abdullah, Abdul Jabbar, **On the dynamics of hurricanes.** *N. Y. Univ. College of Engineering, Meteorological Papers*, 2(2), Sept. **1953.** 43 p. 18 figs., 27 refs., eqs. Contents: Pt. 1, **The eye of the hurricane.** Pt. 2, **Vibrations of a hurricane. DWB**—The first paper presents a model and works out a theory for the eye of the hurricane, assuming that a hurricane is a vortex in an equivalent incompressible 3-layer atmosphere and ignoring friction, rotation and spherical shape of the earth. Vertical accelerations and wind shear are also ignored and the pressure represented by hydrostatic pressure. A numerical example is worked out. In the second article the banded structure is explained as a type of wave motion in a symmetrical vortex. Long-period and short-period oscillations are considered, the cloud patterns for the two types worked out in a model, and the vertical wall is explained. *Subject Headings:* **1. Hurricane dynamics 2. Hurricane cloud-bands.**—*M.R.*

6.8–215 551.515.3(73)

Evans, Edna Hoffman, **Are tornadoes growing worse?** *Nature Magazine*, Wash., D. C., 47(6):293–296, June/July **1954.** photos. **DLC**—It is suggested that the apparently greater number of tornadoes during the past few years in the U.S.A. is due to better reporting and compiling of statistics and not to greater frequency. Loss of life has not increased and property damage has only increased because of more heavily constructed areas and valuable property and rising costs. Many facts about tornadoes, causes, movement, season, damage, safety measures, frequency or probability of being killed or injured during a normal lifetime in different states are presented. In Arkansas the chances are 1 in 1490, in Kansas 1 in 5736 of being killed in 68 years of life. *Subject Headings:* **1. Tornado frequencies 2. Tornado damage 3. United States.**—*M.R.*

6.8–216 551.515.3(431)

Hartman, Kh., **Beobachtung einer Kleintrombe.** [Observation of a small tornado.] *Zeitschrift für Meteorologie*, 8(6):189–191, June **1954.** 4 figs. **MH-BH**—The author described the synoptic situation associated with the tornado which occurred at the foot of Brauhausberg in Potsdam on April 24, 1953. A detailed account of its passage and of the terrain, including a map of its path, are presented. *Subject Headings:* **1. Tornado observation 2. Synoptic conditions for tornadoes 3. Potsdam, Germany.**—*I.L.D.*

6.8–217 551.515.3(439.1)

Kallos, Imréné, **Víztölcsér a Balaton felett.** [Water spout over Lake Balaton.] *Időjárás*, Budapest, 58(4):255–256, July/Aug. **1954. MH-BH**—Waterspouts are a rare phenomenon in Hungary's latitudes. On July 8, 1954 such a phenomenon was observed over Lake Balaton. This note reporting the event includes a general description of the synoptic situation over Europe and a detailed account from an eye witness who observed the spout for 5 or 6 minutes. *Subject Headings:* **1. Waterspouts 2. Lake Balaton, Hungary.**—*G.T.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Physics south of Sahara** (Korff), 6.8–37; **UV radiation** (Dantsig), 6.8–49; **Visibility measurem.** (Petit, Tassëel), 6.8–105; **Infrared auroral spectrum** (Chamberlain, others), 6.8–350; **Auroral theories** (Landseer-Jones), 6.8–352.

6.8–218 551.521.1(493)

Dogniaux, R., **Étude du climat de la radiation en Belgique. Chapitre II.** [Study of the radiation climate in Belgium. Ch. 2.] *Ciel et Terre*, 70(3/4):81–90, March/April **1954.** 6 figs., table. **MH-BH**—The author discusses the direct solar radiation at the top of the atmosphere and its attenuation during passage through the atmosphere as a result of molecular diffusion and absorption; the diffuse solar radiation and terrestrial radiation charts show the annual variation of the normal component of solar radiation, the diurnal variation of the turbidity factor at Uccle for very good weather and the diurnal variation of diffuse radiation for a clear sky. A table gives the percentage of diffuse radiation in the global radiation received upon a horizontal surface at Uccle as a function of diurnal insolation. (For Pt. I *see item* 6.1–161, Jan. 1955, *MAB.*) *Subject Headings:* **1. Solar radiation 2. Global radiation 3. Radiation climate 4. Uccle, Belgium.**—*I.L.D.*

6.8–219 551.521.1:551.508.23(688)

*Drummond, A. J. and Wentzel, J. D., **Actinometric measurements and the radiation climate of South-West Africa.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(3):236–273, **1955.** 9 figs., 13 tables, 19 refs. English, German and French summaries p. 236–237. **DWB**—Observations of direct solar radiation at Mt. Brukkaros (25°52′S, 17°48′E, 5202 ft) 1927–31 and of total and diffuse radiation at Windhoek (22°34′S, 17°6′E, 5670 ft) 1951–1954, are described and summarized. The climate of the high plateau of SW Africa is described. The solar radiation at Brukkaros normal to the sun and on a horizontal surface and the total and diffuse radiation at Windhoek are tabulated and hourly values given and compared. Atmospheric transmission (vertical sun) at Brukkaros averages .79. *Subject Headings:* **1. Solar radiation 2. Radiation climate 3. Southwest Africa.**—*C.E.P.B.*

6.8–220 551.521.1

Georgi, J., **Bemerkungen zu T. E. Aurén, Studies of solar radiation 1951.** [Remarks on "Studies of solar radiation 1951" by T. E. Aurén.] *Geofisica Pura e Applicata*, 28:301–307, **1954.** 11 refs., eq. **MH-BH**—After a detailed analysis of AURÈN's paper and a discussion of the method used and results obtained, the author supports AURÈN's method of obtaining mean maximum curves from a large number of measurements of total solar radiation. These curves represent the characteristic optimal transmittance of the atmosphere at every measuring point. They can be considered therefore as parameters of the radiation climate, either as intensity of the radiation flow or as the daily sums, etc. (For abstract of original paper, *see item* 3.10–140, Oct. 1952, *MAB.*) *Subject Headings:* **1. Solar radiation studies 2. Radiation measurements. I. Aurén, T. E.**—*A.M.P.*

6.8–221 551.521.1:551.521.2

Hofmann, Gustav, **Zur Darstellung der spektralen Verteilung der Strahlungsenergie.** [On the spectral distribution of radiation energy.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(3):274–279, **1955.** 4 figs., 7 refs., 10 eqs. German, English and French summaries p. 274. **DWB**—Solar and terrestrial radiation takes place at very different wavelengths. By transforming PLANCK's radiation equation the separation into a short-wave and a long-wave flux is justified. The boundary must be drawn between 2 and 7μ, in which region there is little radiation of meteorological importance. *Subject Headings:* **1. Infrared radiation 2. Short wave radiation.**—*C.E.P.B.*

6.8–222 551.521.11:551.573

Crabb, George A., Jr. (*U. S. Soil Conservation Service*), **Insolation: a primary factor in evaporation from a free water surface in Michigan.** *Michigan. Agricultural Experiment*

Station, East Lansing, Quarterly Bulletin, 35(2):186–192, Nov. **1952.** table, fig., 19 refs. **DLC**—A comparative presentation of normal daily insolation and evaporation curves for Michigan Hydrologic Research Station, East Lansing, shows that insolation is "a foremost indicator of evaporation rates" in southern Michigan, a region with deficient rainfall. The author describes the non-conventional method of determining evaporation losses applied at East Lansing. The method is based on a shallow black pan mounted on a Fergusson-type 9-in. rain gage and located for comparison near a standard gage. Readings can be obtained with an accuracy of ±0.001 in. *Subject Headings:* **1. Insolation 2. Evaporation losses 3. Southern Michigan.**—*G.T.*

6.8–223 551.521.11:551.576.2

Steinhauser, F., **Über die Beziehungen zwischen Sonnenscheinregistrierungen und Bewölkungsschätzungen und ihre Verwertungsmöglichkeit für die Berechnung der Sonnenscheindauer aus Bewölkungsbeobachtungen.** [The relationship between sunshine and cloudiness records and its use for the calculation of sunshine duration from observations of cloudiness.] *Wetter und Leben*, Vienna, 6(7/9):139–145, Sept. **1954.** 2 figs., 2 tables, 5 refs. **MH-BH**—Using a 22-year record of sunshine duration and cloudiness for a number of stations in Austria, the author attempts to establish a relationship between percent sunshine duration and cloudiness and to test the general validity of this relationship and to examine the validity of this relationship. *Subject Headings:* **1. Sunshine duration 2. Cloudiness 3. Sunshine-cloudiness relationships 4. Austria.**—*I.L.D.*

6.8–224 551.521.14:551.521.3

Härtel, Otto (*Graz*), **Über spektrale Veränderungen des Lichtfeldes durch die Vegetation, 1. Mitteilung.** [On the spectral change of light field through vegetation, pt. 1.] *Wetter und Leben*, Vienna, 6(5/6):118–122, Aug. **1954.** fig., 4 tables, 8 refs. **MH-BH**—Light measurements were carried out on differently oriented rows of plants at Ischia, on the Gulf of Naples, in order to determine the microclimatic role of radiation reflection from the ground. The orientation of the plant rows was such as to obtain a maximum ecological advantage from the incident radiation during the highest temperature of the day. A homogeneous light field is obtained so that the plants are exposed to different wave lengths. Photosynthetically effective wave lengths are used during forenoon hours and too high infrared absorption is avoided during the warmest part of the day. *Subject Headings:* **1. Albedo of earth 2. Absorption of terrestrial radiation 3. Plant microclimatology.**—*I.L.D.*

6.8–225 551.521.14

Neiburger, Morris (*Univ. of Calif. at L. A., Dept. of Met.*), **A note on the reflection of diffuse radiation by the sea surface.** *American Geophysical Union, Transactions*, 35(5):729–732, Oct. **1954.** fig., 3 tables, 6 refs., 4 eqs. **DWB**—The measurements of the fraction returning upward of the downward radiation at various levels below stratus cloud, which were presented by the author in 1948, gave larger values than 0.066, the theoretical value for the reflectivity of a plane water surface. By fitting a regression curve to the data at various elevations, it is shown that the effect of haze below the point of observation can explain only part of the difference, and that the average fraction returning upward at the sea surface is probably 0.095. Powell and Larke's measurements show that scattering by bubbles and particulate matter is probably sufficient to account for the difference between this value and the theoretical value. The particle-size distribution required to give the observed variation of albedo with height is computed and shown to be consistent with the expected distribution above the sea surface. *Subject Headings:* **1. Albedo of sea 2. Diffuse radiation.**—*Author's abstract.*

6.8–226 551.521.16

Hammad, A. (*Dept. of Applied Math., Faculty of Sci., Giza, Egypt*), **Scattered and re-scattered sunlight.** *Mathematical and Physical Society of Egypt, Proceedings*, No. 5:55–62, May **1953.** 2 figs., 2 tables, foot-refs., eqs. Summary p. 55. **DLC, DWB**—In this paper, an exact solution of the complex and difficult problem of the illumination of the atmosphere and ground by sunlight is discussed in the light of numerical results. Full account is taken

of the polarization of radiation by scattering, and allowance is made for the optical anistropy of the molecules of air. The atmosphere is supposed to be stratified in parallel planes and of uniform composition. The intensity of secondary scattered light received at the ground is calculated and the error made in the values of that intensity when the polarization of radiation by scattering is neglected, is considered. It is found that this error may rise to about 35% of the correct values. Predictions based on that solution are put to the test of observation. The neutral points are found to occur in the manner they are observed. The incomplete polarization of the light scattered at right angles to the incident solar beam is fully accounted for, assuming a depolarization factor equal to 0.0415 for the molecules of air. Solutions taking no consideration of that factor fail to account for the observed depolarization. The observations of TICHANOWSKY on the degree of polarization of zenith scattered light are also accounted for when the optical anisotropy of the molecules of air is taken into consideration. *Subject Headings:* **1. Daylight illumination 2. Atmospheric scattering 3. Polarization 4. Scattering angles.**—*Author's abstract.*

6.8–227 551.521.16

*Sauberer, F., **Über die Beleuchtungsstärke in verschiedenen nördlichen Breiten.** [The illumination intensity in different northern latitudes.] *Wetter und Leben*, Vienna, 6(7/9): 145–150, **1954.** 2 figs., 5 tables, 9 refs. **MH-BH**—Data are presented on the total illumination upon a horizontal surface for different solar elevations, midday intensities, daily total, total illumination at different latitudes, and daily sums of total illumination at different latitudes for clear skies, relative values of daily totals of illumination for different cloud amounts at Vienna and daily sums of total illumination for different latitudes of the Northern Hemisphere at varying degrees of cloudiness. The significance of illumination amounts for plant ecology is discussed. *Subject Headings:* **1. Illumination intensity 2. Northern Hemisphere.** —*I.L.D.*

6.8–228 551.521.3:551.573:551.311.12(234.3)

Hoinkes, H., **Measurements of ablation and heat balance on Alpine glaciers with some remarks on the cause of glacier recession in the Alps.** *Journal of Glaciology*, 2(17):497–501, April **1955.** 2 figs., table, 15 refs. English and German summaries p. 497. **DWB**—Measurements of ablation and heat balance on glaciers in the Eastern Alps in summer 1950–53 at 2262–2973 m show a mean daily ablation of 3.16–4.64 cm water. Of this, 58–84% is due to short-wave radiation, in spite of a mean cloudiness of nearly 5 tenths. Air heat contributes 15–30% and latent heat of condensation 5–15%. Ablation depends very largely on albedo due to fresh snowfall. Thus glacier retreat since 1850 in the Alps is attributed to less cloud and snowfall in summer. *Subject Headings:* **1. Glacial ablation 2. Alps.**—*C.E.P.B.*

6.8–229 551.521.3:551.575

Kikuchi, Y.; Yamazaki, M.; Okawa, T. and Morita, Y., **Transmission of solar radiation through fog.** *Geophysical Magazine*, Tokyo, 26(1):83–92, Aug. **1954.** 10 figs., 4 refs., 16 eqs. **DWB**—The water content of fog and the amount of solar radiation above, in and below fogs were measured in order to determine the decrease of solar radiation through fog. Observations were made by means of a captive balloon from which a pyrheliometer and a fog meter were suspended. The transfer theory for the radiation measured is derived from the theory given by SCHUSTER and MECKE on the assumption of the isotropy of the upward and downward radiation fields in fogs. The observed values of solar radiation transmitted through various layers of fog are compared with theoretical results, using the observed mean vertical distribution of fog water content. It is found that the theory may be available for practical problems concerning the transmission of insolation through fogs. *Subject Headings:* **1. Radiation transmission through fog 2. Radiative transfer 3. Water content of fog.**—*From authors' abstract.*

6.8–230 551.521.3

†Vassy, A. and Vassy, E. (*Univ. of Paris*), **Absorption of solar radiation by the atmosphere.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:427–446,

July 1954. 4 figs., table, 75 refs., 10 eqs. Discussion p. 438–442. **MH-BH**—Two distinct methods are available for studying the absorption of solar radiation by the atmosphere. In the first method, the intensity of solar radiation is measured at different solar zenith angles. The intensity of solar radiation, free from terrestrial absorption, and the absorption coefficient for the whole atmosphere may then be determined. Current knowledge of the absorption coefficients of the atmosphere is examined. The coefficients for ozone are fairly well known, and those for the oxides of nitrogen have recently been studied. On the other hand, the data for oxygen question the validity of the absorption law; a pressure effect has been observed for both the bands in the visible range and the remote ultraviolet. Furthermore, the absorption of atomic oxygen has not been investigated, and it seems that such a study will be difficult. Some attention is devoted to the absorption of X-rays by the atmosphere, and to the penetration of corpuscular radiation (electrons and alpha particles). Finally, the recent experimental data on radiation in the upper levels of the atmosphere, obtained by using rockets, are compared with the proposed curve. The observations are in excellent agreement with the computations in the range near 2000 Å between the two strong bands of ozone and oxygen and in fairly good agreement near 1500 Å in the maximum of the oxygen band. However, in the range near 1200 Å, the radiative energy measured is stronger than would be expected. The experimental data concerning atmospheric absorption of auroral electrons are also examined. *Subject Headings:* **1. Absorption of radiation 2. Atmospheric absorption 3. Absorption coefficients 4. Upper atmosphere reduction.**—*From authors' abstract.*

6.8–231 551.521.3:551.521.63

Walton, G. F., **Atmospheric scattering and absorption of ultraviolet sunlight.** *Philosophical Magazine*, London, Ser. 7, 46(374):281–292, March **1955.** 6 refs., 58 eqs. **DWB**—The scattering of a parallel beam of unpolarized sunlight in a plane-stratified atmosphere is considered, taking into account the polarization of scattered light and allowing for the optical anisotropy of the molecules of air. Allowance is also made for the attenuation of the ultraviolet light due to absorption by atmospheric ozone. Expressions are derived for the intensities of the primary, secondary, and tertiary scattered light emitted and received in any direction and at any point in the atmosphere. *Subject Headings:* **1. Ultraviolet absorption 2. Scattering theory.**—*Author's abstract.*

AIR TEMPERATURE

See also: **Iowa State College equipment** (Stewart), 6.8–34; **Temp. fluct.** (Kassander), 6.8–35; **Beaufort scale** (Roll), 6.8–68; **Project in climatology,** 6.8–87; **Night cooling** (Saunders), 6.8–113; **Zonal flow and temp.** (Kochanski), 6.8–202; **Weather and circulation** (Smith), 6.8–205.

6.8–232 551.524.34:551.311.12

Cueto Jimenez, Hector, **Variaciones seculares de la temperatura en La Paz.** [Secular variations of temperature in La Paz.] *Nimbus*, La Paz, 3(10/11):24–26, July/Dec. **1952.** 2 figs. **DWB**—The curve of mean monthly temperature for La Paz (3600 m elev.) shows a decided drop from April to a minimum in July (8.6°C) and a rise to a maximum in Nov. (12.4°C). Records from 1918 to 1951, shown graphically (mean maximum, mean, mean minimum and absolute minimum), indicate that lowest on record was in July 1922 (−3.5°C) and highest absolute minimum was 0.2°C in 1931. An attempt is made to compare this record with secular changes in the Arctic where a marked warming occurred between 1911 and 1935, and where glaciers have been retreating for 200 years. It is stated that glaciers near Chacaltaya, Bolivia (5500 m) have been retreating 1.93 m per year and had increased to 21 m (retreat) in the past year. *Subject Headings:* **1. Temperature variations 2. Glacial retreat 3. La Paz, Bolivia 4. Chacaltaya Observatory, Bolivia.**—*M.R.*

6.8–233 551.524.34

Karapiperis, Photios P. (*Univ. of Athens*), **Trends in Athens temperature.** *Geofisica Pura e Applicata*, Milan, 29:212–217, Sept./Dec. **1954.** 2 figs., 2 tables, 19 refs. **MH-BH**—Temperature records of a long period (1858–1952) for Athens, in the form of overlapping

30-year intervals, are analyzed with a view to investigating temperature trends. While the winter temperature has been rising almost continuously during the period under consideration, the increase of summer temperature—to which the annual temperature and the annual temperature range as well are rather similar—has occurred altogether during the second half of the record. During the first half, the summer and annual temperatures and the annual range were all decreasing. The oceanicity increased during the first half and decreased during the second. The total change has been a rise of 0.90 deg. in winter temperature, a fall of 0.7 followed by a rise of 1.00 deg. in summer temperature, and a fall of 0.3 then a rise of 0.70 deg. in annual temperature. The rapid increase of population and also variations in solar activity seem to have partly influenced the Athens temperature trends. *Subject Headings:* **1. Temperature trends 2. Athens, Greece.**—*Author's abstract.*

6.8–234 551.524.34

Spar, Jerome (*N. Y. Univ., Dept. of Met. and Oceanogr.*), **Temperature trends in New York City.** *Weatherwise*, 7(6):149–151, Dec. **1954.** 2 figs., table. **MH-BH**—An analysis of New York City records from 1879 to 1954 shows gradual though irregular warming. Ten year running means of Jan. temperatures show coldest was decade ending in 1888 (29.07°F) and warmest that ending in 1937 (34.96°F). The present decade will nearly equal the 1928–1937 decade. *Subject Headings:* **1. Temperature trends 2. Mild winters 3. New York City.**—*M.R.*

6.8–235 551.524.35(798)

*Robinson, Elmer and MacLeod, James A., **Wiresonde observations during the 1952–53 winter at Eielson Air Force Base, Alaska.** Stanford Research Institute, Stanford, California, Contract AF 19(122)-634, SRI Project No. CU-473, Scientific Report, No. 3, Report, No. 12, Jan. 22, **1954.** 10 p. 8 figs., table, 3 refs. **MH-BH**—Wiresonde observations taken at Eielson Air Force Base, Fairbanks, Alaska, during Jan. and Feb., 1953, showed a maximum inversion between 4 ft. and 100 ft. of over 10°C, but, for the 69 observations available, the median value of the temperature difference in this layer was +1.5°C. In the layers above 100 ft., the median ΔT is attributed to the ice fog that was usually present when temperatures below −30°C were experienced. There was good agreement between the wiresonde observations and the nearby Fairbanks radiosonde data. A series of observations taken in early Feb. show the diurnal fluctuations of the low-level temperature structure. *Subject Headings:* **1. Wiresonde observations 2. Low level sounding systems 3. Temperature data 4. Fairbanks, Alaska.**—*Authors' abstract.*

6.8–236 551.524.36

Bilancini, R., **Il polo del freddo.** [The cold pole.] *Rivista di Meteorologia Aeronautica* 13(1):54, Jan./March **1953.** **MH-BH**—The question (still unresolved) which has been debated for 20 years, both in Russia and abroad, as to where the cold pole of the earth is located, and even as to the exact minimum temperature recorded at Oimekon—the new contender for the place held by Verkhoiansk, Siberia up to 1930—is examined reasonably. The figure for Oimekon of −77.7°C as the absolute minimum on earth, as reported in the Handbook of Meteorology is considered a typographical error (should be −67.7°C). The inland ice of Greenland has a lower mean annual temperature (−20°C) than Verkhoiansk (−14.5°) or Oimekon (−16.5°C). *Subject Headings:* **1. Cold poles 2. Extreme minimum temperature 3. Oimekon, Siberia 4. Verkhoiansk, Siberia 5. Greenland.**—*M.R.*

6.8–237 551.524.36(776,784

*de Percin, Fernand, **Coldest area in the United States.** *Weatherwise*, 7(6):152–155 Dec. **1954.** 3 figs., 3 tables. **MH-BH**—Mean annual, mean winter and extreme winter temperatures as well as frequency of sub-zero temperatures indicates that the Red River Valley of North Dakota and Minnesota is the coldest place in the U.S.A. Data for the area are shown on charts and tabular data for a number of stations are presented to show location and dates where −60°F or lower have been recorded, and the 15 coldest stations with respect

to mean annual and mean winter temperatures. *Subject Headings:* **1. Temperature extremes 2. Coldest weather records 3. Red River Valley of North Dakota 4. North Dakota 5. Minnesota.**—*M.R.*

6.8–238 551.524.36:551.553.6:629.13(469)

*Portugal. Serviço Meteorológico Nacional, **Frequency of simultaneous occurrence of specified conditions of air temperature and wind component along the runway No. 18–36 at Lisbon Airport during 1948–1953.** Its *RT* 186, MEM 39, Dec. 22, **1954.** 17 p. almost entirely tables. **DWB**—The 32 tables give the number of occasions of simultaneous occurrence of weather conditions (air temperature and wind component along the runway No. 18–36, separately for direction 36–18 and direction 18–36) within specified ranges, in four months (January, April, July and October) at four hours (0200, 0800, 1400 and 2000 L.S.T.—G.M.T.) for Lisbon Airport. (*See also* 5.5–124, May 1954, *MAB.*) *Subject Headings:* **1. Temperature-wind frequency 2. Airport runway climatic data 3. Lisbon Airport, Portugal.**—*Author's abstract.*

6.8–239 551.524.36:551.553.6:629.13(469.9)

*Portugal. Serviço Meteorológico Nacional, **Frequency of simultaneous occurrence of specified conditions of air temperature and wind component along the runway No. 01-19 at Santa Maria Airport during 1947–1953.** Its *RT* 185 MEM 38, Dec. 20, **1954.** 13 p. entirely tables. **DWB**—The 24 tables in the Annexes give the number of occasions of simultaneous occurrence of weather conditions (air temperature and wind component along the runway No. 01-19, separately for direction 01-19 and direction 19-01) within specified ranges, in four months (Jan., April, July and Oct.) at three hours (1200, 1800 and 2400 G.M.T.) for Santa Maria Airport (Azores Islands). Period of records: 1947–1953. *Subject Headings:* **1. Temperature-wind frequency 2. Airport runway climatic data 3. Santa Maria Airport, Azores Islands.**—*Author's abstract.*

SOIL TEMPERATURE

6.8–240 551.525.4

*Stenz, Edward (*Geoph. Inst., Univ. of Warsaw*), **Deep-well temperatures and geothermal gradient at Ciechocinek.** *Acta Geophysica Polonica*, Warsaw, 2(4):159–168, **1954.** 2 figs., 3 tables, 13 refs. Polish summary p. 167–168. **DWB**—In 1929 temperatures were measured in deep wells near thermal-bath resorts to 1140 m depth. In 1950–52 the readings were made regularly to 1378 m (the deepest source of brine in Poland). Maximum thermometers protected from pressure of 140 atmospheres by soldering them in glass tubes 2.5-cm in diameter were arranged in tandem 50 m–100 m apart, suspended on a steel rope 1.5 mm thick, and were kept for 30–40 minutes at a determined depth, and after drilling had stopped for at least 15 hours. Observations were made on 24 days from March 28, 1950 to Oct. 29, 1952. It was found that gradients vary with rate of flow of brine, but highest temperatures occur when flow is fastest, indicating true temperature at bottom of bore hole. Gradients are calculated on this basis and compared with those of other authors in other parts of Poland. *Subject Headings:* **1. Geothermal gradients 2. Borehole temperatures 3. Ciechocinek, Poland.**—*M.R.*

WATER TEMPERATURE

See also: **Beaufort scale** (Roll), 6.8–68; **Lake Kochel thermal economy** (Zorell), 6.8–79.

6.8–241 551.526.6:551.501

*World Meteorological Organization, **Methods of observation at sea, Pt. 1, Sea surface temperature.** Its *Technical Note*, No. 2, **1954.** 35 p. forms, 4 refs. Its *WMO*, No. 26, TP. 8. **DWB**—The problem of obtaining the most effective sea surface temperatures from merchant and weather ships is discussed in all of its many aspects, in this monograph. Pertinent comments by CHARLES F. BROOKS, based on several transocean voyages, and comments by C. E. N. Franckom, President of the Commission for Maritime Meteorology, indicate the

probable error involved in the use of intake temperatures, and the difficulties involved in getting bucket temperatures. Comments from Norway, Netherlands, Canada, the United Kingdom and the U. S. are also included. Several tables of data for various latitudes and types of measurement show that under normal conditions of turbulent sea and cloudiness there is less than 0.5°F difference between bucket and intake temperatures, but on rare occasions, when solar radiation is intense (as in low latitudes) and sea is calm, errors of as much as 3 or 4°F may occur. In these cases the bucket method is the only satisfactory way to get sea surface temperatures. On the other hand when the sea is rough it is almost impossible to get bucket temperatures because the bucket bounces off of the waves without collecting water, and in these cases the intake temperatures are the most representative. Sources of errors for intake measurements are enumerated. *Subject Headings:* **1. Sea surface temperature measurement 2. Sea surface temperature errors 3. Bucket temperature measurements. I. Brooks, Charles F. II. Franckom, C. E. N.**—*M.R.*

6.8–242 551.526.6

*Ball, F. K. (*Section of Met. Physics, C.S.I.R.O., Melbourne*), **Sea surface temperatures.** *Australian Journal of Physics*, Melbourne, 7(4):649–652, Dec. **1954.** table, 4 refs., eqs. **MH-BH**—An experiment was carried out to determine the skin temperature by measuring the long-wave radiation emitted from the sea and comparing it with the dip bucket temperature. The observations were taken from the end of Mordialloc pier during the late summer and autumn of 1953. The results show that the differences between the actual surface temperature and the dip bucket temperature have a mean value of −0.25°C. The standard deviation is 0.32°C, which is consistent with the accuracy of the observations. These results are in substantial agreement with those of Bruch (1940). The experiment was carried out in conditions favourable for the development of a cool skin, i.e., conditions of clear sky and light wind. In general therefore the temperature difference will be less than 0.25°C but in very favourable circumstances may be higher. *Subject Headings:* **1. Sea surface temperatures 2. Mordialloc pier, Melbourne, Australia.**—*From author's introduction.*

6.8–243 551.526.6:551.511

Jung, Glenn H. and Gilcrest, Robert A., **Heat budget of a water column, autumn, North Atlantic Ocean.** *Journal of Meteorology*, 12(2):152–159, April **1955.** 7 figs., table, 11 refs., eqs. **DWB**—The heat budget was studied at the Weather Ship in 52°45′N 35°30′W for Sept. through Nov. 1948 for intervals of 7 days. The total change of sea temperature, surface to 200 m, was calculated from solar radiation (mean 1101 ft.°F), back radiation from the sea surface (−376), evaporation (−1472) and dynamic adjustment to wind shear (−399). Heat conduction from sea to atmosphere and gain or loss through precipitation were neglected. The residual (1253) includes the lateral transfer of heat and other items. Most of this is accounted for by changes of temperature which are uniform with depth. The values assigned to the components are discussed in an Appendix. *Subject Headings:* **1. Sea temperature budget 2. North Atlantic.**—*C.E.P.B.*

6.8–244 551.526.6(261)

*Rodewald, Martin, **Die Abweichungen der Oberflächentemperatur des Ozeans bei den nordatlantischen Wetterschiffen 1951–1953.** [Departures of the surface temperature of the ocean from North Atlantic weather ships 1951–1953.] *Deutsche Hydrographische Zeitschrift*, 6(4/6):170–185, **1953.** 13 figs., 5 tables, 4 refs. German, English and French summaries p. 170–172. **DWB**—Continuation of results for 1950–51 (*see item* 4.2–155, Feb. 1953, *MAB*). Monthly means of 10 weather ships Nov. 1950–Dec. 1953 showed a persistent excess over long-period normal averaging 0.6°C with main maximum in winter 1952–53. Variations at individual ships and variations of air temperature are discussed in relation to charts of pressure anomaly. Mean air temperature excess over American and European coasts (0.59°C) agrees with sea temperature excess. Additional heat storage in surface layers (down to 200 m) of N. Atlantic is estimated. *Subject Headings:* **1. Sea temperatures 2. Weather ships 3. North Atlantic.**—*C.E.P.B.*

PRESSURE AND WIND

PRESSURE

See also: **Lunar tidal variations** (Matsushita), 6.8–167; **Artific. gales** (Weiller), 6.8–256; **Geostrophic wind** (Elliott, Brown), 6.8–265.

6.8–245 551.543:517.512.2

*Takahashi, K. et al, **Periodicities in the meteorological phenomena.** *Journal of Meteorological Research*, Tokyo, 4(7):375–394, Oct. **1952.** 20 figs., 4 tables, 8 eqs. In Japanese; English summary p. (25). **MH-BH**—Results of a harmonic analysis of daily pressure changes over Japan and of 5-day pressure over the Northern Hemisphere are presented in charts and graphs. 5, 12–13, 4 and 10-day periodicities are identified for Japan; 25, 35, 45 and 65-day periods for Asia and the North Pacific, and 4 and 8-day as well as 5 and 9-month periods for the Northern Hemisphere. The study includes an attempt at applying these results to long-range forecasting. Satisfactory 2-month forecasts for Japan are reported. A fairly comprehensive summary and the figure captions will make the principal features of this substantial paper readily accessible to the English-speaking reader. *Subject Headings:* **1. Harmonic analysis 2. Pressure periodicities 3. Long range forecasting 4. Japan.**—*G.T.*

6.8–246 551.547.1

Bhalotra, Y. P. R. (*Met. Off., New Delhi*), **On the use of hill stations data for drawing contours on isobaric surfaces.** *Indian Journal of Meteorology and Geophysics*, Delhi, 5(3):239–242, July **1954.** 4 tables, 3 refs., 3 eqs. **MH-BH**—The technique of constant pressure analysis has been brought into daily synoptic use in several countries. For preparing constant pressure chart a well-distributed network of radiosonde stations is required. As the present network of such stations in India and neighbourhood is not sufficiently close, it will be helpful if the data of hill stations can be projected on constant pressure charts to make these charts more comprehensive. The present paper gives the results of efforts to find how far this procedure will be useful. HARIHARAN (1949) studies whether day to day heights corresponding to 850 and 700-mb surfaces could be calculated over all the pilot-balloon stations in India from the normal contour charts, knowing the departure from normal of pressure and temperature at the station on the day and assuming that the departure from normal of the mean temperature from normal of surface temperature. The heights so calculated, however, did not agree with the actual radiosonde heights and showed no relation to them. In this paper the possibility of making use of day to day pressure and temperature data of hill stations for obtaining the heights of standard isobaric surfaces over them, and using these height values on contour line charts, has been examined. *Subject Headings:* **1. Constant pressure analysis 2. Constant pressure charts 3. Meteorological networks 4. India.**—*Author's abstract.*

6.8–247 551.547.1:551.510.5

Sebastian, H., **Fehlanzeigen der Flugzeughöhenmesser durch Abweichungen von der Normalatmosphäre.** [Errors of the aeroplane altimeter through departures from the standard atmosphere.] *Meteorologische Rundschau*, 8(1/2):24–31, Jan./Feb. **1955.** 8 figs., 5 tables, 11 refs. **MH-BH**—The calibration of the aircraft altimeter assumes a standard atmosphere which represents the annual means of pressure, temperature and density in middle latitudes. In low and high latitudes the differences between the standard and actual atmospheres cause systematic errors in height determinations which may amount to hundreds of meters. The magnitude of these errors is calculated for Jan. and July, 700 and 500 mb, for the Northern Hemisphere and for July 1952 for the Southern Hemisphere, and the results shown on maps. Several stations are considered in detail. *Subject Headings:* **1. Pressure height calculations 2. Standard atmosphere.**—*C.E.P.B.*

TURBULENCE

See also: **Atmos. turbulence** (Saha), 6.8–17; **Equipment used in Great Plains field test** (Stewart), 6.8–34; **Temp. fluct.** (Kassander, others), 6.8–35; **Austausch problem** (Kohlsche), 6.8–197.

6.8–248 551.551:536.7

Blackadar, Alfred K., **Extension of the laws of thermodynamics to turbulent systems.** *Journal of Meteorology*, 12(2):165–175, April 1955. 2 figs., 23 refs., 71 eqs. **DWB**—The energy equations applicable to the mean state of a turbulent fluid are reviewed, and a concept of the relative flux of turbulent kinetic energy is defined. It is shown that such irreversible processes as the decay of mean motion into turbulence, the relative flux of turbulent energy, and eddy diffusion are not governed by the classical laws of thermodynamics, but properly belong in the field of eddy thermodynamics proposed by RICHARDSON. It is found that there exists an eddy analogue of the entropy which is a function of the eddy energy and partial densities of the various constituents of a fluid, and which observations suggest is consistently created by irreversible phenomena of turbulence. This property of eddy entropy is incorporated into a statement which is called the second law of eddy thermodynamics. *Subject Heading:* **1. Thermodynamics of the atmosphere.**—*Author's abstract.*

6.8–249 551.551:629.13

*Chilton, Robert G. (*Langley Aeronautical Lab., Langley Field, Va.*), **Some measurements of atmospheric turbulence obtained from flow-direction vanes mounted on an airplane.** *U. S. NACA, Technical Note*, No. 3313, Nov. 1954. 22 p. 8 figs. (incl. photo), 5 refs., 11 eqs. **DWB**—The power spectrum of high-frequency turbulence in the atmosphere was calculated from measurements made in flight. The spectrum was found to display an inverse variation with the square of frequency. This variation is in agreement with the high-frequency asymptote of the spectrum form commonly associated with isotropic turbulence. Flow-direction vanes were used to measure vertical and horizontal components of gust velocity relative to the airplane and normal to the flight direction. The power spectral densities of the two components were, for practical purposes, equal. *Subject Headings:* **1. Atmospheric turbulence 2. Turbulence measurements in flight 3. Flow-direction vanes.**—*NACA abstracts.*

6.8–250 551.551

Cramer, Harrison E. and Record, Frank A., **Power spectra of the eddy-velocity components.** *Journal of Meteorology*, 12(2):146–151, April 1955. 7 figs., 2 tables, 12 refs., eqs. **DWB**—Power spectra of the eddy-velocity components have been determined at four levels within the layer from 2 to 12 meters under varying conditions of mean wind speed, trajectory and thermal stability. A filtering technique suggested by J. W. TUKEY has been used to obtain rough estimates of contributions to the total variance for seven consecutive frequency intervals within the range from about 0.5 to 0.005 cycle per second. At the higher frequencies studied, variances for all three components are approximately equal and equipartition of turbulent energy is thus indicated. Spectra for the u- and v-components appear to be invariant with frequency at the lowest level, and tend to increase slowly with decreasing frequency at the higher levels. The w-spectra at all levels fall off sharply with decreasing frequency, contributions to the vertically-directed energy becoming almost negligible at the lowest frequencies investigated. *Subject Heading:* **Eddies.**—*Authors' abstract.*

6.8–251 551.551:551.508.59

*Cramer, H. E.; Gill, G. C. and Record, F. A., **Research on atmospheric turbulence and associated diffusion of aerosols and gases near the earth's surface.** Massachusetts Institute of Technology. Round Hill Field Station, Contract AF 19(604)-145, Final Report, June 15, 1954. 49 p. 21 figs. (incl. photos.), tables, refs. **DWB**—This report consists of a study of the structure of atmospheric turbulence with particular emphasis upon the evaluation of the intensities and scales of the fluctuations, and actual measurements of diffusion from continuous point sources. The results of a series of determinations of the variance spectra of the eddy velocity components in the layer from 2–12 m are discussed; "the frequency interval

investigated ranges from about 0.5–0.005 cycle sec^{-1}." A discussion of the modification of the basic instrumentation for measuring fluctuations in wind speed and air temperature as well as of the instruments required for measuring time-mean values of these quantities is included. Illustration, diagrams and graphs of the response characteristics of the instruments are included. *Subject Headings:* **1. Atmospheric turbulence 2. Turbulence instrumentation 3. Turbulent diffusion of gases.**—*I.L.D.*

6.8–252 551.551:533.15

Davies, D. R., **On the problem of diffusion from an instantaneous point source released at ground level into a turbulent atmosphere.** *Quarterly Journal of Mechanics and Applied Mathematics*, 7(4):462–467, Dec. **1954.** 3 refs., 27 eqs. Also: **The problem of diffusion into a turbulent boundary layer from a plane area source, bounded by two straight perpendicular edges.** *Ibid.*, 468–471. 4 refs., 19 eqs. **DWB**—In the first paper O. G. SUTTON's formula for diffusion from an instantaneous point source at ground level is shown to be a particular solution of the basic 3-dimensional equation of atmospheric diffusion, with constant wind velocity. The eddy diffusivity coefficients depend on t^{α}, where t is time measured from the instant of generation and $\alpha=(1-m)(1+m)$, m being a turbulence parameter. The second paper derives formulas for rate of evaporation and distribution of vapor from a plane area source in the form of an infinite quadrant. *Subject Heading:* **1. Turbulent diffusion.**—*C.E.P.B.*

6.8–253 551.551:533.15

Fleishman, B. A. and Frenkiel, F. N., **Diffusion of matter emitted from a line source in a non-isotropic turbulent flow.** *Journal of Meteorology*, 12(2):141–145, April **1955.** 4 figs., 5 refs., 20 eqs. **DWB**—Turbulent diffusion from an infinite line source in a homogeneous, stationary, non-isotropic turbulent flow is studied. Spatial mean-concentration distributions are determined as functions of the statistical characteristics of turbulence. Particular attention is given to the evaluation of mean concentrations at relatively small distances from the source both upstream and downstream. At high intensities of turbulence, the resulting mean-concentration values may differ considerably from those obtained when the turbulent diffusion in the wind direction is neglected. *Subject Heading:* **1. Turbulent diffusion.**—*Authors' abstract.*

WIND

See also: **Temp. and wind freq. at Lisbon Airport, 6.8–238; . . . at Santa Maria Airport, 6.8–239.**

6.8–254 551.553.12:551.588.2

Flohn, H., **Zur vergleichenden Meteorologie der Hochgebirge.** [On the comparative meteorology of high mountains.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(3):193–206, **1955.** 3 tables, 24 refs. German, English and French summaries p. 193. **DWB**—High plateaus are warmer than the free air by day in summer. In the Bolivian Altiplano there is by day a steady valley wind from the NE and an overlying WNW current. By night the circulation is reversed but much weaker. S of about 17°S the W wind prevails. Pt. 2 deals with the influence of this circulation on the probability and amount of rain in the mountains. In Pt. 3 the mountain circulations are classified into: a) local circulations with daily change of direction (slope winds, mountain and valley winds), b) local circulations without change of direction but with a diurnal change of force (glacier winds) and c) general circulations with daily variations of force due to exchange. Tibet and the Andes S of 17°S reach the level of the westerlies but have a thermal anticyclone in summer. *Subject Heading:* **1. Mountain winds.**—*C.E.P.B.*

6.8–255 551.553.12

Yamashita, R., **On breezes along a mountain slope.** *Meteorological Society of Japan, Journal, Ser. 2*, 32(1):1–10, Jan. **1954.** 6 figs., 5 tables, 15 eqs. **MH-BH**—The author makes a study of the breezes along a mountain slope in a similar way to that adopted in his previous paper **On Land and Sea Breezes** (*see item* 5.9–192, Sept. 1954, *MAB*). In the circulation due

to heat in such low layers, the surface friction seems to play a remarkable part. The calculated values of the wind velocity seem to be consistent with the observed ones, if an appropriate value of the frictional coefficient is taken. Finally, the author suggests a reason why the average wind vector revolves daily at an observing station situated in the inland plain. *Subject Heading:* **1. Mountain and valley breezes.**—*Author's abstract.*

6.8–256 551.553.8 551.557:551.542.1

Weiller, A. R., **Les tempêtes artificielles sont-elles pour demain?** [Will artificial gales be produced tomorrow?] *La Météorologie*, Paris, 4th Ser., No. 34:127–136, April/June **1954.** 12 figs., ref., 23 eqs. French, English and Spanish summaries p. 127. **MH-BH**—The gradient wind equation is developed and the four solutions, namely: the normal cyclonic, the cyclonic with anti-Buys Ballot rotations, and two anticyclonic rotations rotating in the same sense are discussed. The physical atmospheric conditions which account for the nonoccurrence or nonexistence of the clockwise cyclonic wind and the "very strong anticyclonic wind" which have the greatest force are analyzed mathematically and the possibility for producing artificially these winds by increasing the pressure gradient in an anticyclone above the maximum critical value is considered. *Subject Headings:* **1. Artificial winds 2. Gradient winds 3. Pressure gradient.**—*I.L.D.*

SPECIAL WINDS

See also: **Wind components** (Chase), 6.8–63; **Air navigation** (Durst), 6.8–72.

6.8–257 551.555.1:551.576.1

Malkus, Joanne Starr, **Aeroplane studies of trade-wind meteorology.** *Weather*, 8(10): 291–300, Oct. **1953.** 10 figs., cover picture. **MH-BH.** Also in: *U. S. Office of Naval Research, Research Reviews*, April 1953, p. 12–20. **DWB**—Account of investigations of trade wind cumulus by Woods Hole Oceanographic Institution and TYRENA (TYphoon REsearch NAvy). Energy transport from sea surface upwards is mainly by water vapor carried up to 2000 ft by turbulence and then in cloud chimneys. A small fraction penetrates trade inversion (about 7000 ft) and evaporates. The energy released is enough to drive the atmospheric circulation. The entrainment theory and its consequences in inhibiting growth are discussed, with a steady state model of a cumulus in a wind increasing upwards. The technique of observations of structure by aircraft is described and some typical results set out with cross sections and photos, which confirm the model. Some data on cloud growth by coagulation of cloudlets were also obtained. *Subject Heading:* **1. Trade wind cumulus.**—*C.E.P.B.*

6.8–258 551.555.3(436)

*Schutz, J. and Steinhauser, F., **Neue Föhnuntersuchungen aus dem Sonnblickgebiet.** [New föhn investigations form the Sonnblick region.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(3):207–224, **1955.** 4 figs., 10 tables, 6 refs. German, English and French summaries p. 207–208. **DWB**—Numerous thermohygrographs were installed round Sonnblick at heights of 850–1954 m, enabling föhn to be followed from crest of Alps to bottom of valleys. The number of föhn days ranged from 70–125 and of hours from 419–1680; differences at different levels are investigated. Föhn was most frequent in March–April and Sept.–Nov. and at 12–16 h, rarest in Aug. and at 0–8 h. Occurrences are classified into cyclonic, anticyclonic or free, and indefinite; cyclonic föhn is most frequent in spring and fall. Periods, durations, and times of beginning and end are examined. The criterion of föhn is not the wind direction in the valley but the vertical temperature gradient and the change of temperature and humidity. During the day cases were found with the surface wind blowing upwards (masked föhn). *Subject Headings:* **1. Föhn winds 2. Sonnblick, Germany.**—*C.E.P.B.*

6.8–259 551.555.4

Band, Günther, **Bora und Mistral—ein Vergleich.** [Bora and mistral—a comparison.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(3):225–235, **1955.** 3 figs. 4 tables, 8 refs. German, English and French summaries p. 225–226. **DWB**—The bora

occurs locally between Trieste and the Black Sea, where topography is suitable. The mistral occurs in a low-lying region in two relatively broad paths. The average 500 mb topography and surface pressure are examined for each. Author concludes that the mistral is a geostrophic-antitriptic wind; the high to the west only steers the cold air. The cold air is usually deep, often 10 km. The bora on the other hand is a true fall wind, often blowing against the gradient, and is shallow, as is shown by the bora scura. The specific humidity of the mistral is not that of a typical fall wind and the high velocity is due to the constriction of its path by the Alps and Pyrenees. *Subject Headings:* **1. Bora 2. Mistral.**—*C.E.P.B.*

WIND EFFECTS

See also: **Properties of upper atmos., 6.8–93.**

6.8–260 551.556:551.465

Freeman, John C., Jr. (*A. & M. College, Texas*), **Wind mixing currents.** *Journal of Marine Research*, 13(2):157–165, Nov. **1954.** 4 figs., 2 refs., 11 eqs. **DWB**—A wind system may create an ocean current by differential mixing in a two layer ocean; such a current may be imposed on other currents due to the wind. In one situation studied, such differential mixing produced an average transport of water about 10 to 20% of the transport due to wind stress. *Subject Heading:* **1. Wind driven currents.**—*Author's abstract.*

6.8–261 551.556:525.3

Mintz, Yale and Munk, Walter, **Effect of winds and bodily tides on the annual variation in the length of day.** California. Univ. at L. A. Dept. of Meteorology, Contract AF 19(122)-48, Scientific Report, No. 5, Oct. **1953.** 23 p. 4 figs., 2 tables, refs. **MH-BH**—The effect of winds is to vary the length of day by 0.7 millisecond between Feb. and Aug. The bodily tides result largely in a semiannual variation of 0.4 ms. The combined effect of winds and tides is not far out of line with astronomic measurements since 1950. The fluid core of the earth hardly participates in these variations in angular velocity and there is a half-year slippage of 23 meters between core and mantle at the equator. Eventually the astronomic measurements may provide basis for determining the Love number h. *Subject Headings:* **1. Length of day 2. Wind effects 3. Tides.**—*Authors' abstract.*

6.8–262 551.556:551.465

Shuleĭkin, V. V., **Razvitie voln ot navetrennego berega do podvetrennego, na glubokom more.** [Formation of waves from the windward to leeward shores in a deep sea.] *Akademiia Nauk SSSR, Doklady*, Moscow, 93(3):381–384, Sept. 21, **1954.** 2 figs., 8 refs., 16 eqs. **DLC**—Recent investigations have shown that the wave run can be considered mechanically, for the wind acts not upon the geometrical profile but upon material particles moving in orbits, so that instead of the run it is necessary to investigate the energy flow which is imparted to these particles in the direction of wave movement. This nonhomogeneous energy, flow produces the inequality of points lying between the windward and leeward shores. Equations for determining the heights of waves at given distances from the windward shore are developed. *Subject Headings:* **1. Wave formation 2. Wind-wave energy transfer.**—*I.L.D.*

6.8–263 551.556:551.465:532.593

Yoshida, Kozo, **Energy distribution in the wind-wave spectrum.** *Tokyo. Univ. Geophysical Institute, Geophysical Notes*, 4(1), Contribution No. 8, Aug. 1952. 2 figs., 6 refs., 20 eqs. Also in *Oceanographical Society of Japan, Journal*, 7(2):49–54, **1951. MH-BH**—It has been suggested in a previously published paper that observed data of wave growth require the assumption of some sort of energy transfer from shorter waves to longer waves in a wind-wave spectrum. In the present paper, we discuss such processes of energy transfer between component waves, by making use of the well known results which have been deduced semi-empirically regarding the significant-wave. General features of wind-wave spectra for any stage of wave development being closely related to the process, the results from the present theory check with actual data of these spectra. *Subject Headings:* **1. Wind wave energy transfer 2. Wind wave spectra.**—*Author's abstract.*

6.8–264 551.556.1:551.515.3:621.396.6

Booker, C. A. (*New Eng. Power Serv., Co., Boston*), **On transmission towers destroyed by the Worcester, Mass., tornado of June 9, 1953.** *American Meteorological Society, Bulletin*, 35(5):225, 229, May 1954. 2 figs. **MH-BH**—The probable minimum and maximum wind velocities of the June 9, 1953 tornado in Worcester, Mass., are estimated from the strength values of transmission towers established previously by factory test. Average velocities of 148 and 170 mph and a maximum peripheral velocity of 343 mph were estimated. *Subject Headings:* **1. Tornado wind velocities 2. Wind load on structures 3. Tornado wind damage 4. Tornado, Worcester, Mass. (June 1953) 5. Worcester, Mass.**—*I.L.D.*

UPPER AIR WINDS

See also: **Jet stream problem** (Faust), 6.8–10; **Ionosph. wind measurem.** (Yerg), 6.8–195; **Ionosph. winds** (Yerg), 6.8–196; **Wind conditions** (Buch), 6.8–200; **Artificial gales** (Weiller), 6.8–256.

6.8–265 551.557:551.542.1

§Elliott, William P. and Brown, H. Albert, **Evaluation of geostrophic deformation on isobaric surfaces.** Texas Agriculture and Mechanical College. Dept. of Oceanography, Contract AF 19(604)-559, Scientific Report, No. 3, Nov. 1953. 10 p. 5 figs., charts, ref., eqs. Also: Saucier, Walter J., **Accumulation of isotherms on an isobaric surface by geostrophic motion.** *Ibid.*, No. 4, Nov. 1953. 16 p. 4 figs., 5 refs., eqs. **MH-BH**—(I) A method for the evaluation of rate of deformation of the geostrophic wind is described. The essential elements are an overlay grid and a nomograph for the final evaluation. The construction of each is described and an example of their use is presented. Finally an actual constant pressure map (500 mb, 1500Z, Dec. 2, 1952) is presented with the analysis of the field of deformation. (II) This report summarizes the factors involved in horizontally concentrating, or accumulating, the isopleths of an air property. These are differential horizontal advection, differential vertical advection, and differential non-conservative influences on the property. The remainder of the report is devoted to the first of the above factors, which had been discussed some years ago by Petterssen. The horizontal or isobaric accumulation of isotherms by geostrophic motion is dependent on the magnitudes of deformation and temperature gradient, as well as on the directions of those two quantities. Two methods are outlined for determining the rate of accumulation, and synoptic patterns of the rate of accumulation are illustrated. *Subject Headings:* **1. Geostrophic wind deformation 2. Nomograms 3. Constant pressure charts.**—*Authors' abstract.*

6.8–266 551.557:551.590.25:77

Liller, William and Whipple, Fred L. (*Harvard College Obs.*), **High-altitude winds by meteor-train photography.** (In: Boyd, R. L. F.; Seaton, M. J. and Massey, H. S. W. (eds.), **Rocket exploration of the upper atmosphere.** London, Pergamon, 1954. p. 112–130. 11 figs., 6 tables, 9 eqs.) **DWB.** Also issued as *Harvard Reprint Series*, II, No. 62, 1954(?). **DWB**—Wind velocities from the motions of five photographic persistent meteor trains have been measured as a function of altitude in the range from 81 to 113 km. Multiple photographs of the trains have been made with Schmidt and Baker Super-Schmidt telescopes of wide field and fast focal ratio, $f/0.65$. The mean wind speed normal to the trains is 38 m per sec., and the mean velocity 29 m per sec. Corresponding total velocities are estimated at 68 m and 51 m per sec. respectively. The winds change rapidly with altitude, having average maximum shears of 50 m per sec. per km. Deviations from the average winds for each train show a zero correlation with winds separated about 5 km in height (scale height = 6.8 km), but two show negative correlations for greater height differences to 10 km or more. A nearly horizontal train shows much smaller wind fluctuations with distance than the others which are highly inclined. These results suggest tentatively that about half the kinetic energy of the high-altitude winds is contained in large-scale systematic motions and the others which are highly inclined. These results suggest tentatively that about half the kinetic energy of the high-altitude winds is contained in large-scale systematic motions and the other half in shallow

(3–10 km) eddies, perhaps of the order of 50-km diameter in horizontal motion. *Subject Headings:* **1. Meteor trail photography 2. Upper air winds.**—*Authors' abstract.*

6.8–267 551.557.31:525.6

†Stolov, Harold L., **Tidal wind fields in the atmosphere.** *Journal of Meteorology*, 12(2): 117–140, April **1955.** 12 figs., 4 tables, 48 refs., 38 eqs. **DWB**—The wind field near 100 km is analyzed into a semidiurnal tidal wind and a non-periodic wind associated with pressure and temperature gradients. The effect of the magnetic field, and the viscous terms, are negligible up to at least the E region. Diagrams show the world-wide pressure and wind fields associated with the tidal wind at 1½ hr intervals, with wind arrow scales for surface and 100 km. The surface wind is compared with CHAPMAN's observed tidal wind at Mauritius, the much larger winds at 100 km with those deduced from meteor trails, noctilucent clouds and radio echoes from ionized meteor trails and from the ionosphere. The first two give confused results but the last two agree well enough with the calculated winds. *Subject Heading:* **1. Atmospheric tides.**—*C.E.P.B.*

VERTICAL CURRENTS

See also: **Convection** (Priestley), 6.8–199; **Stationary vorticity field** (Watanabe), 6.8–203.

6.8–268 551.558

Castañs Camargo, Manuel, **Ondas estacionarias sobre España.** [Stationary waves over Spain.] *Spain. Servicio Meteorológico Nacional, Publicaciones, Serie A, Memórias*, No. 23, **1954.** 16 p. 9 figs. English summary p. 3. **DWB**—The formation of stationary waves over Spain is observed in the so-called northern weather situation, which is associated with the passage of a low pressure system into the Mediterranean. The föhn phenomenon associated with the stationary waves is not well marked in the temperature and humidity conditions near the ground. This is especially true in the Ebro Valley where a thin layer of air moving along the valley floor prevents the upper cross mountain flow from descending to the ground. The positions of the waves as determined by soundings over Bordeaux are modified on the basis of data obtained with glider flights. *Subject Headings:* **1. Standing waves 2. Spain.**—*I.L.D.*

6.8–269 551.558.1:536.2

Priestley, C. H. B. and Ball, F. K., **Continuous convection from an isolated source of heat.** *Royal Meteorological Society, Quarterly Journal*, 81(348):144–157, April **1955.** 3 figs., table, 6 refs., 34 eqs. **DWB**—Laws are derived for the variation of vertical velocity, w, and temperature, θ, with height, z, above a continuous circular source of heat of finite extent, on the assumptions that the lateral profiles are of similar shape at different distances above the source and that the resistance is a quadratic function of w. The lateral profiles are then taken to be Gaussian, though not all the properties deduced are dependent on this assumption. Complete solutions are obtained allowing for the thermal stratification of the environment; unless this stratification is neutral the common assumption that the vertical heat flux is constant with height is no longer true. It is shown that the width of the column will increase uniformly with height. In general w increases with z at low elevations and then decreases, but this second stage does not occur when the environmental lapse rate is large and the source area sufficiently extensive. Under superadiabatic conditions the second stage, when it occurs, is followed by a third stage in which w increases again without limit; under subadiabatic conditions w decreases rather abruptly to zero at a certain "ceiling" height, for which a simple approximate formula is derived. Numerical values illustrate the application of the solutions to problems of atmospheric pollution, frost prevention, and dry thermals. The solution for neutral conditions is compared with RAILSTON's laboratory measurements. *Subject Heading:* **1. Convection.** —*Authors' abstract.*

6.8–270 551.558.21

Suzuki, S., **On the orographic effect on atmospheric pressures and currents, Pt. 6.** *Geophysical Magazine*, Tokyo, 25(1/2):151–158, Jan. **1954.** 5 figs., 16 refs., 21 eqs. **MH-BH**—

A formula

$$v = \frac{\partial \psi}{\partial x} = h\Omega \sin \phi x e^{-2\pi/l(z-h)} \sin \frac{2\pi x}{l}$$

is derived from the theory of vorticity (ROSSBY) to show the relation between the characteristics of a mountain range and the deflection of the ascending air currents. The assumption is made that the currents undergo lateral deformation while ascending and descending the range. It is shown that the deformation depends on only 2 characteristics of the mountain profile, namely the height and the steepness, and decreases exponentially with increasing height above the range. *Subject Headings:* **1. Orographic effects 2. Air flow over mountains 3. Vorticity theory.**—*M.R.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY AND EVAPORATION

See also: **Water-loss investigations,** 6.8–16; **Polar ice melting** (Korff), 6.8–22; **Dew point calculation** (Tenani), 6.8–85; **Insolation** (Crabb), 6.8–222; **Ablation and heat balance** (Hoinkes), 6.9–228.

6.8–271 551.571:551.464

Arons, A. B. (*Woods Hole Oceanogr. Inst., Mass.*) and Kientzler, C. F. (*Amherst College, Mass.*), **Vapor pressure of sea-salt solutions.** *American Geophysical Union, Transactions,* 35(5):722–728, Oct. **1954.** 3 figs., 2 tables, 6 refs. **DWB**—Vapor pressures of sea-salt solutions at temperatures between freezing and 25°C are reported and are tied in with previously reported measurements of HIGASHI made at temperatures between 25 and 175°C. *Subject Headings:* **1. Vapor pressure of sea salt solutions 2. Salinity observations.**—*Author's abstract.*

6.8–272 551.573

Benton, George S. and Dominitz, Jack, **The use of atmospheric data in the evaluation of evapotranspiration.** Johns Hopkins University, Dept. of Civil Engineering, Contract AF 19(122)-365, Scientific Report, No. 3, Sept. **1954.** 39 p. 15 figs., 5 tables, 10 refs., 21 eqs. **MH-BH**—A method of evaluating evapotranspiration is developed which is based on the mass balance of water vapor in the atmosphere. The method is applied to various regions of the North American continent for the calendar year 1949 and the results are compared with hydrologic data and with an empirical method of estimating evapotranspiration. It is shown that accurate value of evapotranspiration can be obtained by large areas such as the entire continent, but that the accuracy of the method is reduced as the size of the area under consideration is decreased. The potentialities and limitations of the proposed method are also evaluated. *Subject Headings:* **1. Evapotranspiration estimates 2. Water vapor 3. Hydrologic cycle.**—*Authors' abstract.*

6.8–273 551.573:551.584:551.508:014.3

*Johns Hopkins University. Laboratory of Climatology, Seabrook, New Jersey, **Micrometeorology of the surface layer of the atmosphere,** Contract W28-099-ac-378, Interim Report No. 18, April–June 30, 1952. June 30, **1952.** 114 p. 8 figs., mostly tables. **DWB.** Idem, **Index to interim reports, No. 1–18. Final Report on the Contract.** June 30, **1952.** 13 p. **DWB**—Detailed data are given for micrometeorological profiles, smoke dispersal, potential evapotranspiration and current meteorological conditions. A small anemometer and a temperature difference recording apparatus are described. The index to all reports gives subject headings, a list of signed articles and a valuable survey of observational results. (For complete abstract *see item* 4B–326, Feb. 1953, *MAB.*) *Subject Headings:* **1. Micrometeorological profiles 2. Evapotranspiration 3. Micrometeorological instruments 4. Indexes. I. Thornthwaite, C. W.**—*A.A.*

6.8–274 551.573:551.579

Langbein, W. B. and Harbeck, G. E. (*U. S. Geological Survey, Wash., D. C.*), **Studies of evaporation.** *Science*, 119(3088):328, March 5, **1954.** **DWB**—Indirect methods have been used in the past for most evaporation estimates in hydrology. Studies of direct measurement made at Lake Hefner, Oklahoma, proved useful in estimating evaporative loss from Lake Mead. Wind tunnel tests are being conducted at Fort Collins, Colorado in a model of Lake Hefner, to find out if problem can be solved in the laboratory. *Subject Headings:* **1. Evaporation investigation 2. Evaporation loss 3. Hydrologic cycle 4. Lake Hefner, Okla.**—*M.R.*

6.8–275 551.573:536.42

Davies, D. R. (*Univ. of Sheffield*), **An approach to the problem of evaporation from a limited area.** *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Memoires et discussion*, pub. **1953.** p. 255–262. fig., 13 eqs. **DWB**—An idealized approach to the problem of evaporation from an area, limited in both length (parallel to the wind) and width, is outlined, considering lateral diffusion. Mathieu functions of an untabulated type would enter the exact solution. A simplified solution and wind tunnel tests suggest that the evaporation is proportional to the 0.85 power of the width. The author refers to a number of valuable papers without giving the references. *Subject Headings:* **1. Evaporation from small areas 2. Lateral diffusion.**—*A.A.*

6.8–276 551.573:551.508.72

Garnier, B. J. and Lewis, W. V., **Potential evapo-transpiration: an appeal for its measurement.** *Weather*, London, 9(8):243–245, Aug. **1954.** fig., 3 refs. Also: Rigg, B. J., **Potential evapotranspiration.** *Ibid.*, 10(1):31–32, Jan. **1955.** 9 refs. **DWB**—Importance of evapotranspiration as a climatic element is emphasized and a simple evapotranspiration gage illustrated in article by Garnier and Lewis. Referring to their article, Rigg discusses evapotranspiration as a factor of microclimate, and need for further investigations. *Subject Headings:* **1. Evapotranspiration 2. Evapotranspiration instruments.**—*C.E.P.B.*

6.8–277 551.573 631.6

Jacobson, W. L. (*Canada. Dept. of Agri.*), **Consumptive use of water studies in irrigated areas of Alberta.** *I.U.G.G. International Association of Scientific Hydrology, Brussels, 1951*, [*Transactions*], 3:499–501, **1952.** **DWB**—General report on irrigation studies at the Lethbridge Experimental Station. The Alberta region in Canada is influenced by dry chinook winds. Annual precipitation of about 13 in. is subjected to high evapotranspiration losses. *Subject Headings:* **1. Evapotranspiration 2. Irrigation 3. Lethbridge, Alberta.**—*A.A.*

6.8–278 551.573:551.578.4

Kehrlein, Oliver; Serr, Eugene, Sr. (*both Sierra Club*); Tarble, Richard D. and Wilson, Walter T. (*both U. S. W. B.*), **High Sierra snow ablation observations.** *Western Snow Conference, 21st, Boise, Idaho, April 1953.* [*Proceedings*], p. 47–50. Also: Church, James E., **Further on the evaporation and melting of snow at high altitudes,** *Ibid.*, p. 51–52. fig., table, 5 refs. **DWB**—Gives hourly data for two days for snow melt, dry and wet bulb temperature, sunshine and other weather conditions. The measurements were made on the crest of Mt. Whitney. Snow evaporation or condensation affected the total ablation only very little, but apparently much melt water is later evaporated from moist soil and water surfaces. Church stresses that evaporation of snow is definitely important in the total balance, while the Mt. Whitney observations were made during the summer with prevailing snow melt. *Subject Headings:* **1. Snow ablation 2. Evaporation from snow 3. Mt. Whitney, Calif.**—*A.A.*

6.8–279 551.573:631.4

Kittredge, Joseph, **The influence of shade and litter of pine on evaporation from a clay loam soil at Berkeley, California.** *Ecology*, Durham, N. C., 35(3):397–405, July **1954.** 4 tables, refs. **DLC**—The losses by evaporation from a bare soil are compared with the losses from the same soil under the shade or litter of a dense stand of pine in order to determine the effect of the forest on total and seasonal evaporation and on cumulative evaporation. The

variations of evaporation with depth of soil and with soil mixture are analyzed. Empirical equations for cumulative evaporation from soil with time and from the upper part of soil after a rain and for daily evaporation as soil moisture decreased are presented. *Subject Headings:* **1. Evaporation from soil 2. Duff effects on evaporation 3. Berkeley, California.** —*I.L.D.*

CONDENSATION

See also: special bibliography on **Condensation Nuclei**, p. 1163.

6.8–280 551.574.1:551.578.41

Kobayashi, Teisaku, **On the ice crystals formed on hydrophobic substances: a general survey. (Studies on small ice crystals. Pt. 2.)** *Sapporo, Japan. Hokkaido Univ. Institute of Low Temperature Science. Contributions*, No. 6:7–18, **1954.** 4 figs., 58 photos., 8 refs. **MH-BH**—Since the hydrophobic surface which covers the glass plate may serve to protect the growth of crystals from the disturbing action of the glass surface, it is to be anticipated that the hoar crystals that grow on the surface will assume the forms similar to the snow crystals in the free atmosphere. Using several hydrophobic substances, e.g., Daiflon-2, polyvinyl formal, etc., we succeeded in producing the snow-like crystals on these surfaces. In this paper, observations on the mode of such crystal formation are described in detail by aid of many photomicrographs, and the problems relating to the mechanism of frost development in its early stage are also discussed. *Subject Heading:* **1. Ice crystal formation.**—*Author's abstract.*

6.8–281 551.574.4:621.315

Lenhard, Robert W., Jr., **An indirect method for estimating the weight of glaze on wires.** *American Meteorological Society, Bulletin*, 36(1):1–5, Jan. **1955.** 4 figs., table, 2 refs. **MH-BH**—The relationship between the weight of glaze on power lines and common meteorological variables is examined. The icing data used are those collected by the Pennsylvania Electric Association; the meteorological data are those available in third-order climatological station records. A graphical correlation between ice weight, daily precipitation total and a derived temperature variable is obtained. In addition, the regression of ice weight on daily precipitation is explored and the probability of occurrence of daily maximum and minimum temperature associated with glaze storms is given. These two relations are suggested as alternative estimating tools. *Subject Headings:* **1. Glaze 2. Icing data 3. Icing of wires 4. Ice loads on wires.**—*Author's abstract.*

FOG

See: **Fog in the North** (Johansson), 6.8–13; **Objective forecasting** (Winden), 6.8–117; **Forecasting of fog** (Clarke), 6.8–118; **Radiat. transmis. through fog** (Kikuchi, others), 6.8–229.

CLOUDS

See also: **Ceiling and visibility forecasting,** 6.8–116; **Sunshine and cloudiness** (Steinhauser), 6.8–223; **Trade-wind met.** (Malkus), 6.8–257.

6.8–282 551.576.12

Zingg, Th. (*Snow and Avalanche Invest. Inst., Davos, Switzerland*), **Wolkenklassification auf morphologischer Grundlage.** [Cloud classification from a morphological point of view.] *Geofisica Pura e Applicata*, Milan, 29:218–225, Sept./Dec. **1954.** 3 figs., 5 refs. German, French and English summaries p. 218. **MH-BH**—The author proposes a systematical cloud classification according to their form (shape), their association (structure) and their distribution in the sky. Every form of a single cloud which appears independent of other forms is called main form or main shape. The following forms can be distinguished: layer, wave, lens, veil, thread, bale, flake, cumulus, thorn. Other forms may be added if necessary. All possible combinations of forms are to be found in between the main forms, so that there will be a secondary form next to the main form (e.g., wave-lens). There are other forms called details; which exist only with main or secondary forms (e.g., mammatus). Some examples given in this study show the importance of cloud formations and their distribution in space. Dis-

crimination between form, formation and distribution provides a convenient way of classifying clouds. *Subject Headings:* **1. Cloud classification 2. Cloud forms 3. Cloud structure.**—*Author's abstract.*

6.8–283 551.576.4

Appleman, Herbert S. (*Air Weather Service, Wash., D. C.*), **A method for estimating the height of cirrostratus clouds.** *American Geophysical Union, Transactions*, 35(6):988–990, Pt. 1, Dec. **1954.** 2 figs., table, ref. **MH-BH**—Difficulties in estimating the height of cirrus clouds and the rather frequent gross error in the reported estimates have been pointed out from time to time. Until the recent development of operational interest in such high levels, this problem has not been given much attention. An approach to the problem was suggested by the oft-reported observation of pilots that when cirrostratus is present, condensation trails usually form when the aircraft nears the cirrus level. This implied that the contrail forecasting chart used by the Air Weather Service might also be used to estimate the height of an existing cirrus layer. *Subject Headings:* **1. Cirrostratus clouds 2. Cloud height estimates 3. Condensation trails.**—*Author's abstract.*

PRECIPITATION

See also: **Rainfall abnormalities** (Govindaswamy), 6.8–8.

6.8–284 551.577:551.515.23(73)

Berg, Hellmut (*Univ. of Köln*), **Gestalt und Veränderung der Niederschlagsgebiete Nordamerikanischer Hurrikane.** [Form and change of precipitation areas of North American hurricanes.] *Geofisica Pura e Applicata*, 28:273–284, **1954.** 6 figs., table, 14 refs. **MH-BH**—Maps of hourly precipitation were drawn for two hurricanes of North America. The development of precipitation areas can be shown in the course of the development of the hurricane. The precipitation area is rather circular only in the beginning. It changes very quickly: the rain area ends suddenly in the rear; moreover it is not large on the left side of the path. But there is extended precipitation ahead and on the right side. In the last stage the precipitation area leaves the center of the hurricane. A dynamical explanation is tried; influences of different air masses are rejected; influences of the surface of the earth are supposed to be very small. Convergences which may lead to the formation of clouds or to precipitation are formed on the one hand by deviation from geostrophic wind with the deepening of the vortex and because of the falling of pressure in front of the hurricane, on the other hand by convergences of flow in the area of entrance ("Einzugsgebiet"). Divergences are formed in filling up and in the rising of pressure behind the moving center and in the delta of the isobars. The changing of precipitation areas may be explained as the effect of a combination of these factors. *Subject Headings:* **1. Hurricane rainfall 2. Precipitation areas 3. Convergence 4. North America.**—*Author's abstract.*

6.8–285 551.577:523.74(415)

*Dixon, F. E. (*Irish Met. Service*), **The annual precipitation at Dublin, Ireland.** *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Memoires et discussion*, pub. **1953.** p. 167–184. figs., 11 tables, 23 refs. **DWB**—Precipitation measurements since 1759 are summarized, and a carefully homogenized series of annual totals is presented for the period 1836–1950. Statistical properties are discussed, and a possible connection with sunspots is studied. A periodogram analysis revealed a number of periods with the largest amplitude of 4.7% for 18⅓ years. Autocorrelation for series of up to 36 successive years is computed. *Subject Headings:* **1. Long period records 2. Precipitation records 3. Sunspot effects 4. Dublin, Ireland.**—*A.A.*

6.8–286 551.577.11

Egner, Hans; Eriksson, Erik and Emanuelsson, Arne, **Composition of atmospheric precipitation, pt. 1, Sampling technique. Use of ion exchange resins.** *Uppsala.* (*K.*) *Lantbrukshögskolans, Annaler*, 16:593–602, **1949.** 4 figs., 10 refs. **DLC**—In order to investigate the composition of atmospheric precipitation in Sweden, a technique using ion exchange resins

has been developed. The possibilities of nitrate reduction, and ammonia losses, when the precipitation is collected in zinc gages is stressed. Glass funnels are used, and they are effectively protected from bird droppings. The ion exchange resins so far available are quite serviceable but show some deficiencies as to stability, and activity in alkaline solutions. New resins, which are not yet available, seem to offer definite advantages. *Subject Headings:* **1. Precipitation composition 2. Ion exchange resins.**—*Authors' abstract.*

6.8–287 551.577.3:551.579.1/2

Glasspoole, J., **Rainfall in relation to water supply.** *Royal Meteorological Society, Quarterly Journal*, 81(348):268–273, April **1955.** 14 refs. **DWB**—Deals first with the accuracy of rainfall measurements. The variation of rainfall over the British Isles is described, including the estimation of the amount over mountain areas. The variation with time, the frequency of droughts, and the reliability of rainfall are discussed. *Subject Headings:* **1. Rainfall observation 2. Rainfall variability 3. British Isles.**—*C.E.P.B.*

6.8–288 551.577.34

Kraus, E. B., **Secular changes of tropical rainfall regimes.** *Royal Meteorological Society, Quarterly Journal*, 81(348):198–210, April **1955.** 7 figs., 4 tables, 14 refs. **DWB**—Changes of rainfall are studied by percentage residual mass curves (1861–1940) for a number of tropical and subtropical stations. Nearly all show a period of rainfall above normal ending about 1898, which probably began in the 1820's. Change was due to a contraction of the rainy season and an expansion of the arid belt, and may have been due to a change in the mean strength of the westerlies or their distance from the equator. Seasonal curves sometimes agree but sometimes differ, depending on monsoons. Precipitation depends mainly on evaporation from the sea, and a comparatively small decrease of wind velocity could cause a large decrease of evaporation. *Subject Headings:* **1. Rainfall regime 2. Rainfall trends 3. Tropics.**—*C.E.P.B.*

6.8–289 551.577.36(415)

*Morgan, W. A., **Frequency of heavy daily rainfalls in Ireland.** *Eire. Meteorological Service, Geophysical Publications*, 4(1), **1953.** 17 p. 6 figs., 7 tables, 7 refs., 12 eqs. **DWB**—The theory of the distribution of the extreme member of a sample is applied to annual extremes of daily rainfall for a selection of 16 stations over Ireland and the actual observations are shown to agree quite well with the theoretical distribution. It is shown also that observed frequencies of values falling above certain limiting points of the theoretical distribution are not in disagreement with the theoretical expectation. Values of daily rainfall likely to be reached once in 10 years, once in 20 years and once in 50 years are computed on the basis of the theory and maps are drawn showing the distribution of such heavy falls. *Subject Headings:* **1. Rainfall frequencies 2. Ireland.**—*Author's abstract.*

6.8–290 551.577.37

*Baldacci, Osvaldo, **La intensita medie delle piogge in Italia.** [The average intensity of rainfall in Italy.] *Società Geografica Italiana, Rome, Bollettino, Ser.* 8, 5(3/4):185–213, May/Aug. **1952.** figs., tables, foot-refs. English summary, p. 312. **DWB**—A large color isopleth chart of Italy is prepared from 5 years or more (1928–34) of precipitation data from 164 meteorological stations, using as a formula $i = q/t$ or average intensity $= \frac{\text{total precipitation}}{\text{duration of precipitation.}}$ Intensities are computed for individual months and years as well as mean intensities. Frequencies of maximum and minimum intensities are computed and shown graphically for Venetia and Sicily to show variability of regime. Effect on soil erosion is worked out quantitatively for various regions. Relation of monthly total precipitation to intensity is shown graphically for S. Martino di Castrozza and Palermo. *Subject Headings:* **1. Rain intensities 2. Soil erosion 3. Italy.**—*M.R.*

6.8–291 551.577.37(51)

*Heywood, Graham S. P. and Huang, Hsia-Chien, **Intensity and duration of rainfall in Hong Kong.** *Hong Kong. Royal Observatory, Technical Notes*, No. 6, June **1953.** 3 p. 2

figs., 3 tables, 3 refs. **DWB**—Autographic rain gages have been in operation since 1884 in Hong Kong, but most of the material was lost during the Japanese occupation. Eleven years of records have been analyzed in order to determine the maximum rainfall, which ranged from 12.5 mm for 5 min up to 247 mm for 24 hrs. The results are compared with records from standard gages (1 hr to 31 days), extended over 60 yrs and with the corresponding world records. *Subject Headings:* **1. Maximum rainfall 2. Rainfall intensity duration curves 3. Hong Kong, China.**—*A.A.*

6.8–292 551.577.37(74)

*U. S. Weather Bureau, **Maximum station precipitation for 1, 2, 3, 6, 12, and 24 hours, Part 6, New England.** *U. S. Weather Bureau, Technical Paper*, No. 15, Part 6, **1954.** 123 p. almost entirely tables. Idem., **Part 7, South Carolina.** *Ibid.*, No. 15, Pt. 7, **1954.** 42 p. 6 figs., numerous tables. **DWB**—An extensive compilation of data for 114 stations in the 6 New England States for the 11-year period 1940–1950, inclusive, during which weighing rain gages have been in operation in the United States. Eventually this study will be extended to cover the whole United States (3000 gages), where maximum values recorded by ordinary rain gages exceed those of weighing gages, the former are used. Maps show maximum recorded values for all first order stations for 1, 2, 3, 6, 12 and 24 hour periods. Tables give, for each station, dates and maximum amounts for above periods for each month and for the year. A supplementary table gives maximum values for entire area for each month and each interval. Values may be low because fixed hourly intervals are used. *Subject Headings:* **1. Maximum precipitation data 2. New England. I. Brown, A. E., Jr.**—*M.R.*

RAIN AND SNOW

See also: **Depth of snow cover,** 6.8–3; **Snow cover** (Rikhter), 6.8–14; **Snow in Gt. Brit.** (Lamb), 6.8–78; **Snow ablation** (Kehrlein, others), 6.8–278; **Ice crystal forms** (Kabayashi), 6.8–280.

6.8–293 551.578.11

Mowat, Michael J. D., **Chlorine and sodium in precipitation.** *Weather*, 10(5):170, May **1955. DWB**—Variations in the ratio of chlorine to sodium in precipitation are attributed to the separation of the sodium (in the lower part of a drop) from the chlorine (in the upper part) by strong electric fields. When the drop splits transversely the sodium-rich part will fall as rain, the sodium combining with water and CO_2. The chlorine-rich part is carried upwards and forms hydrochloric acid; it falls in the later stages of a storm. *Subject Heading:* **1. Rain water analysis.**—*C.E.P.B.*

6.8–294 551.578.41:551.579.2

Craddock, George Washington (*U. S. Forest Service, Ogden, Utah*), **Water yield from snow as affected by consumptive water losses.** Paper presented at Joint Meeting, Western Snow Conference and the Colorado River Basin Water Forecast Committee, Salt Lake City, Utah, April 19–21, **1954.** 7 p. tables, 7 refs. **DWB**—The author discusses the possibilities of reducing evapotranspiration losses of snow cover by watershed management involving the change of plant cover. The role of vegetation in the deposition of snow and upon the hydrologic cycle and upon the yield of water from snow is summarized. *Subject Headings:* **1. Water content of snow 2. Evaporation of snow 3. Cover influences.**—*I.L.D.*

6.8–295 551.578.43

Ludlum, David M., **The snow season of 1953–54.** *Weatherwise*, 8(1):25–27, 34, Feb. **1955.** 2 figs. (incl. photo). **DWB**—The description of the snow season for the United States contains an account of storms, data on snowfall depth and a snowfall map for the winter of 1954–55. *Subject Headings:* **1. Snowfall regime 2. Snowstorms 3. United States.**—*I.L.D.*

6.8–296 551.578.7

§Brown, Harry E. and Roe, Charlotte L. (*U. S. W. B., Wash., D. C.*), **The New England sleet storm, December 22–24, 1952.** *Monthly Weather Review*, 80(12):250–255, Dec. **1952.**

11 figs., 13 refs. **MH-BH**—Synoptic analysis of an unusual storm by means of pressure charts for sea surface and 500 mb, relative topography 1000–500 mb and 700 mb height departure charts from normal. Precipitation, mostly sleet, fell for 18 consecutive hours. The long duration is explained by blocking conditions in the Atlantic (High from Labrador to southeast). A number of criteria and formulas were tested for this case (Rex, Elliot and Smith, Pettersen, Rossby, Sutcliffe, George, Namias and Clapp). *Subject Headings:* **1. Synoptic studies 2. Sleet storms 3. New England.**—*A.A.*

HYDROMETEOROLOGY

See also: **Proceedings of UNESCO,** 6.8-50; **Evapor. studies** (Langbein, Harbeck), 6.8-274; **Rainfall variation** (Glasspoole), 6.8-287; **Water yield from snow** (Craddock), 6.8-294.

6.8–297 551.579

Ashford, Oliver Martin, **Water resource development.** *World Meteorological Organization WMO Bulletin*, 3(4):143–144, Oct. **1954. MH-BH**—The role of the WMO in international development of water resources is considered most important, especially in regard to collection of hydrologic data for planning irrigation, hydroelectric and flood prevention projects. The WMO has agreed to accept responsibility for this area of UN work, and has taken action by various means. Preparatory work was done by the old IMO Hydrological Commission at Toronto in 1947, and by the WMO Commission for Climatology and the I.U.G.G. IAH in collaboration with the WMO. *Subject Headings:* **1. Hydrological developments 2. Water resources 3. WMO. Commission for Climatology.**—*M.R.*

6.8–298 551.579:63

L'vovich, M. I., **Vodnyĭ rezhim rek i sel'skoe khoziaĭstvo.** [Water regime of rivers and agriculture.] *Priroda*, Moscow, 43(10):43–53, Oct. **1954.** figs., illus., table, refs. **DLC**—The author discusses the effect of meteorological factors which act through the soil, and the effect of agricultural and forest practices upon the water regime of rivers with special reference to conditions in the U.S.S.R. Various Russian studies on the effect of different farming practices upon soil characteristics and the action of the destruction of forests, of reforestation, steppe cultivation, etc. upon river flow are summarized. *Subject Headings:* **1. River hydrology 2. Hydrologic cycle 3. Soil conservation 4. Agricultural hydrology 5. U.S.S.R.**—*I.L.D.*

6.8–299 551.579

*Pfaff, C. and Friedrich, W., **Die Wasserbilanz des bewachsenen Bodens nach Lysimeter-Versuchen.** [Water balance of the soil under plant cover according to lysimeter studies.] *Wasser und Boden*, Bonn, 6(9), Sept. **1954.** 5 p. 2 figs., 7 tables, 8 refs. **DWB**—As a result of extensive lysimeter studies conducted at the agricultural experiment station of Limburgerhof, Germany, average values of water supply (precipitation and irrigation), infiltration and evaporation are presented for bare soil of different composition and for soil under various plant covers, with or without fertilizer. A scatter diagram showing the correlation between precipitation and evaporation is presented. The data were obtained for periods of varying length between 1932 and 1952. *Subject Headings:* **1. Lysimeter investigations 2. Hydrologic cycle 3. Cover influences 4. Limburgerhof, Germany.**—*G.T.*

6.8–300 551.579 551.481

Renqvist, Henrik, **Inland waters of Finland.** *Finland. Hydrografiska Byrån, Hydrografisen Toimiston Tiedonantoja*, 13:161–201, **1951.** 22 figs., 6 tables, 6 refs. **DWB**—English translation of original Finnish (for abstract *see* 4.1–202, Jan. 1953, *MAB*). *Subject Headings:* **1. Hydrology 2. Limnology 3. Finland.**

6.8–301 551.579:628.1

Rowntree, N. A. F., **Water supply.** *Royal Meteorological Society, Quarterly Journal* 81(348):273–280, April **1955.** 4 figs., table, 5 refs. **DWB**—The estimation of the quantity of water required and the assessment of the yield from an unreservoired and a reservoired

surface catchment and from underground sources are described. The factors affecting the yield—topography, geology, rainfall, river flow, evaporation and percolation—are summarized. Finally floods and other difficulties are discussed. *Subject Heading:* **1. Water supply.**—*C.E.P.B.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See also: **Industrial climatology** (Grundke), 6.8–12; **Agro-met.** (Robertson), 6.8–81; **Evapo-transpiration** (Garnier, Lewis), 6.8–276.

6.8–302 551.58

Bacsó, Nándor, **Az éghajlatkutatás módszertani kérdései.** [Methodological problems of climatology.] *Időjárás*, Budapest, 58(4):228–232, July/Aug. **1954. MH-BH**—Improvements in climatological research objectives and methods are suggested. In collecting and analyzing data more attention should be paid to composite values (such as sensible temperature, etc.). Investigations of the causes of climatic phenomena (the unusual phenomena, to begin with) should be mainly directed at identifying cosmic influences and determining large-scale synoptic relations. Climatic variations should be analyzed in their physical as well as statistical aspects. Investigation of the possibilities of climate modification (through afforestation, etc.) should be taken up in conjunction with climatic, microclimatic and agricultural research. *Subject Headings:* **1. Problems in climatology 2. Climatological research.** —*G.T.*

CLIMATE OF PARTICULAR PLACES

See also: **Local climatic investig.** (Van Eimern), 6.8–12; **Project in climatology,** 6.8–87.

6.8–303 551.582(436)

*Hader, Fritz, **Extreme Witterungsabläufe und Wetterwendepunkte im Klima von Wien und ihre Beziehung zum Weltklima.** [Extreme weather sequences and singularities in the climate of Vienna and their relation to world climate.] Vienna, Verlag Freytag-Berndt und Artaria, **1948.** 34 p. 3 figs., 24 tables, refs. *Wiener Geographische Studien*, No. 18. **DLC**—The climatic data for Vienna from 1775–1947 are analyzed in a scholarly manner and the extremely cold or warm years, months and days cited and discussed. The frequency of cold or warm months or years in various quarter centuries is also analyzed and the persistence of cold or warm days, months or years treated in tables, graphs and text. A comparison is made between temperature values for 1901–1930 and other periods. Singularities are also discussed. *Subject Headings:* **1. Climate of Vienna 2. Singularities 3. Temperature extremes 4. Austria.**—*M.R.*

6.8–304 551.582:656.7(682)

*King, J. A., **Weather at Jan Smuts Airport in the rainy season October 1953 to March 1954.** *South Africa. Weather Bureau, News Letter*, No. 63:3–4, June **1954.** 3 figs. **DWB**—An analysis of meteorological observations covering a period of 182 days and 3972 observations. Data are given on cloud heights, visibility, surface wind speed and direction and rainfall. The incidence of low clouds and visibility at the Jan Smuts Airport is compared with that at Durban, Kimberley, Pietersburg and Palmietfontein. *Subject Headings:* **1. Airport climatic data 2. Ceiling and visibility frequencies 3. Jan Smuts Airport, Johannesburg, Union of South Africa.**—*I.L.D.*

6.8–305 551.582(485)

†Moberg, Ivar, **Västergötlands geografi.** [The geography of Västergötland.] *Västergötland, Bidrag till landskapets kulturhistoria och naturbeskrivning*, A 7, **1950.** 113 p. 22 figs., tables, 81 refs. **DLC**—Geological-meteorological survey. The climate of Västergötland is maritime in the west and continental in the east. The characteristic locally conditioned climates are but little known due to the scattered observation sites. Mean values of summer

and winter temperatures, some data on freezing of lakes, duration of snow cover and the general distribution of precipitation are given for certain locations at different periods. *Subject Headings:* **1. Local climates 2. Västergötland, Sweden.**—*W.N.*

6.8–306 551.582:656.7(471.1)

*Venho, S. N., **Study of the meteorological conditions at Turku Airport.** *Finland. Ilmatieteellinen Keskuslaitos, Toimituksia*, No. 37, 1954. 16 p. 10 tables. **DWB**—Data covering the period Dec. 1946–Nov. 1951 are presented for Turku Airport (SW Finland). The tables include daily and total frequency of wind speed and direction, frequency of ceiling and visibility and of specified flying conditions, various types of hydrometeors and temperature and the diurnal variations in these elements. Frequencies of specified flight conditions are also listed according to wind speed and direction. *Subject Headings:* **1. Airport climatic data 2. Frequency data 3. Ceiling—visibility—wind data 4. Turku Airport, Finland.**—*G.T.*

6.8–307 551.582.1(268)

Becker, Richard, **Das Sommerklima am Nordpol.** [The summer climate at the North Pole.] *Annalen der Meteorologie*, 6(7/8):251–252, **1953/54.** fig., table, ref. **MH-BH**—A summary of the results of the Papanin ice drift of 1937–38. A figure shows the wind frequencies and a table summarizes the temperatures. *Subject Headings:* **1. Climate of North Pole 2. North Pole.**—*C.E.P.B.*

6.8–308 551.582.1(51)

Chen, Cheng-Siang, **The Pescadores.** *Geographical Review*, 43(1):77–88, Jan. **1953.** 9 figs., table. **DWB**—This geographical study of the Pescadores contains a brief description of their climate. The annual course of wind velocities and rainfall are shown in graphs; and some data on the total annual evaporation, mean annual maximum and minimum temperatures and relative humidity are given. *Subject Headings:* **1. Climate of the Pescadores 2. Pescadores.**—*I.L.D.*

CLIMATIC CHANGES

See also: **Glacial period in U.S.S.R.** (Gerasimov, Markov), 6.8–11; **Earth's axis of rotation** (Gold), 6.8–21; **Thermal conductivity** (Birch), 6.8–24; **Oceanic influences** (Romer), 6.8–316.

6.8–309 551.583.14(94)

Deacon, E. L. (*Sect. of Met. Physics, C.S.I.R.O.*), **Climatic change in Australia, 1880–1940.** *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-verbaux des Séances, Mémoires et discussion*, pub. **1953.** p. 194–197. fig., 2 tables, ref. **DWB**—Ten year running averages of mean summer maximum temperatures show a systematic decline of several degrees F. Thirty-year averages for 1881–1910 and 1911–40 reveal the same effect. Summer rainfall seems to have increased in the south and decreased in the southwest of Australia. *Subject Headings:* **1. Climatic changes 2. Australia.**—*A.A.*

6.8–310 551.583.2(52)

*Arakawa, Hidetoshi (*Met. Res. Inst., Tokyo*), **Climatic change as revealed from freezing dates of Lake Suwa (36°N, 138°E) in the Central Japan.** [**1954.**] 3 p. 2 tables, Mimeo. **DWB**—Freezing dates of Lake Suwa, Japan, are suggested as an approximate index of winter severity. Records on freezing dates, available for over 5 centuries, may provide valuable climatological information. Author presents tables of freezing dates in terms of their frequency distribution by 10-day periods (1443–1700 and 1700–1954). He also lists years in which Lake Suwa remained ice-free. "The frequency of mild winters in the last 2– centuries" is found to be "relatively large." *Subject Headings:* **1. Historical climates 2. Freezing of lakes 3. Long period records 4. Lake Suwa, Japan.**—*G.T.*

6.8–311 551.583.2:551.311.18(261.2)

Goedecke, Erich, **Über Intensität und Reihenfolge der Eiswinter an der deutschen Nordseeküste für die Periode 1872–1950.** [Intensity and sequence of ice winters on the

German North Sea coast 1872–1950.] *Annalen der Meteorologie*, 6(7/8):202–212, **1953/54.** 6 figs., 10 tables, 8 refs. German and English summaries p. 202. **MH-BH**—The amount of ice in the Heligoland Bight before 1903 is calculated from the winter sea surface temperature and the sum of low temperatures at Hamburg. After 1903 they are direct observations. Winters are classified in order of amount of ice, 1946/7 and 1890/1 being the worst. The decrease in the amount of ice since 1911 is shown mostly in the moderate years. *Subject Headings:* **1. Sea ice variations 2. North Sea.**—*C.E.P.B.*

6.8–312 551.583.3

Reissinger, Adolf, **Bemerkungen zur Quartärgeologie des schwäbischbayerischen Alpenvorlandes.** [On the Quaternary geology of the Swabian-Bavarian Alpine foothills.] *Zeitschrift für Gletscherkunde und Glazialgeologie*, 3(1):79–82, Dec. **1954. DLC**—Discussion of glacial conditions during Wurm. Erosion and gravel beds are considered to indicate a large climatic fluctuation during maximum glaciation. This was first moist and cool (erosion) then dry and cold (accumulation). *Subject Headings:* **1. Glacial periods 2. Alps.**—*C.E.P.B.*

6.8–313 551.583.3:582(436)

von Lürzer, Eva, **Das Spätglazial im Egelseegebiet (Salzach-Vorlandgletscher).** [Late Glacial in Egelsee region (Salzach foothill glacier).] *Zeitschrift für Gletscherkunde und Glazialgeologie*, 3(1):83–90, Dec. **1954.** 2 figs., 20 refs. **DLC**—A number of pollen diagrams are reproduced and the development of vegetation described. Stages: treeless, birch spreading, older pine, younger birch, younger pine, pine-birch. Dating is discussed. *Subject Headings:* **1. Quaternary climates 2. Pollen analysis 3. Austria.**—*C.E.P.B.*

MICROCLIMATOLOGY

See also: **Climates in miniature** (Franklin), 6.8–5; **Iowa State College equipment** (Stewart), 6.8–34; **Microclimatology,** 6.8–273; **Field microclimatology** (van Eimern), 6.8–325.

6.8–314 551.584.61

Cagliolo, Alberto (*Arg. Met. Service*), **Marcado gradiente térmico en vagones de ferrocarril.** [Marked thermal gradient in freight cars.] *Meteoros*, Buenos Aires, 4(4):395–398, Oct./Dec. **1954.** 2 figs. **DWB**—The thermal conditions prevailing during the summer in freight cars were studied in types of cars. Graphs showing the daily maximum and minimum temperatures are presented. *Subject Headings:* **1. Thermal gradient 2. Freight car temperatures.**—*I.L.D.*

CLIMATIC CLASSIFICATION

6.8–315 551.585:63

Moniak, Jan, **Znaczenie klimatu delty Wisły dla zagadnień gospodarczych.** [Importance of the climate of the Vistula Delta in economic problems.] *Przegląd Geograficzny*, Warsaw, 21(3/4):267–273, **1947.** tables. French summary p. 273. **DLC**—A paper describing only those meteorological elements which are of greatest importance to agriculture, namely: precipitation; duration, direction and intensity of winds; humidity; cloudiness; number of days with frost, etc. As a result of the study the author divides the delta into two climatic regions: the southern Baltic region—a strip of the littoral 10 km wide with high relative humidity, much low cloudiness and few warm days; and to its south, a region of much more continental climate which is called the Baltic continental climate region. The character of the climate of both these regions is compared, and differences that must be taken into consideration in agricultural and economic planning are noted. *Subject Headings:* **1. Agricultural climatology 2. Agro-climatic regions 3. Baltic region.**—*A.M.P.*

6.8–316 551.585.1:551.583

*Romer, Eugeniusz, **O wspołczesnej oceanizacji klimatu europejskiego.** [On the recent growing oceanic influence on the climate of Europe.] *Przegląd Geograficzny*, Warsaw, 21(1/2): 103–107, **1947.** tables. English summary p. 104–106. **DLC**—Although little change is noted in the mean annual temperature 1850–1930; data for seasonal temperature and precipita-

tion for 17 selected stations in Northern and Central Europe show a consistent increase in winter temperature and a decrease in summer temperature or a lower annual variability, which together with an increase in mean annual precipitation (between the 1851–1900 and 1900–1930) indicates an increasing oceanic influence. *Subject Headings:* **1. Climatic variations 2. Oceanic influences 3. Central Europe.**—*M.R., A.M.P.*

BIOCLIMATOLOGY

6.8–317 551.586:001

Sargent, Frederick, II (*Univ. of Ill.*), **Glossary [of technical terms, particularly medico-biological sciences and bioclimatology].** *Meteorological Monographs*, Boston, 2(8):118–121, October **1954. MH-BH**—The author has compiled definitions of selected technical medical and biological terms used in bioclimatology. *Subject Headings:* **1. Medical climatology 2. Bioclimatology 3. Definitions.**—*I.L.D.*

6.8–318 551.586:519.24

Kutschera, W., **Über die Voraussetzungen medizin-meteorologischer Arbeiten.** [On the assumptions of medical meteorological research.] *Wetter und Leben*, 6(10/12):211–216, **1954.** 7 refs. **DLC**—A discussion of the value of statistical methods in biological-meteorological investigation. Statistics of fronts in relation to disease assume that fronts always indicate vertical motion and that the reactions of the patient are always the same. The latter assumption, at least, is doubtful. Only by analysis of a great number of different cases or by long-continued observation of a patient under consistent conditions can reasonable assurance be obtained. In only a few cases, e.g., bronchial asthma, is a definite conclusion of relationship to weather possible. *Subject Heading:* **1. Bioclimatic research.**—*C.E.P.B.*

6.8–319 551.586:599.9

†Herrington, L. P. (*Yale Univ.*), **Biophysical adaptations of man under climatic stress.** *Meteorological Monographs*, Boston, 2(8):30–42, Oct. **1954.** 5 figs., 6 tables, 28 refs., eqs. **MH-BH**—"The principal features of man's adaptation to climate are described as a special case of the broader biological problems of achieving a common standardized body temperature in animals of greatly different tissue mass. The biophysical consequences of a variable temperature environment are then considered with respect to the relative efficiency of adaptation by increased heat production, development of peripheral insulation and utilization of thermal capacity properties as these efficiencies change with tissue mass." The author discusses the constitutional adjustments of the animal body to habitat temperature as indicated in studies on mice, the interrelationship among body mass, thermal equilibrium, time and the diurnal temperature stimulation coefficient, the energy costs of cold stress as related to the life span of human beings; the biophysical characteristics of human thermal interchange with the environment through radiation, convection, evaporation and conduction; the physiological response of the human body to heat; the upper limits of evaporation regulation, physiological response to cold stress, water balance and endocrine changes; dietary requirements under climatic stress; local skin response to cold; and fatal exposure to cold. *Subject Headings:* **1. Climatic stress 2. Acclimitization 3. Heat tolerance.**—*I.L.D.*

6.8–320 551.586:612

Letavet, A. A. and Medved', L. I., **Osnovnye zadachi gigieny truda v sel'skom khoziaĭstve.** [Basic problems of industrial hygiene in farming.] *Gigiena i Sanitariia*, No. 6:10–14, June **1954. DLC**—Most important problems of industrial hygiene in modern farming are: 1) protection of human organism from unfavorable meteorological conditions (high and low temperatures, extreme insolation, high humidity) and 2) protection from dust and gases. Investigations of Kiev Institute show that tractor drivers and other operators of farm machinery have somewhat higher body temperature as a result of high air temperatures and high insolation. Kiev Institute constructed special umbrella and driver's cabin (double-walled with thermo-insolating floors and front wall) to protect the driver from radiation effects. *Subject Headings:* **1. Physiological climatology 2. Heat effects on man 3. Industrial hygiene.**—*S.A.*

6.8–321 551.586:612.67

Obenland, E., **Untersuchung über die Wetterabhängigkeit des Todeseintritts.** [Investigation of the weather dependence of time of death.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(3):292–316, **1955.** fig., 8 tables, 11 refs. German, English and French summaries p. 292–293. **DWB**—Daily (mostly hourly) records of 1257 deaths at Sonthofen (Allgau) are correlated with upglide and labile processes, fronts and cyclonic föhn. Most of the relations found are within the limits of error. Only when deaths and weather are very closely related some statistically real relationships appear. These are investigated by the *n*-method using hourly values, and significant peaks are found at cold fronts and labile processes. A change from anticyclonic to disturbed weather gives a significant increase of deaths. *Subject Heading:* **1. Bioclimatology.**—*C.E.P.B.*

6.8–322 551.586:616

Mörikofer, W., **Man and the atmosphere.** *World Meteorological Organization, WMO Bulletin*, 4(1):21–25, Jan. **1955.** 2 figs. (photos), 3 refs. **DWB**—The several meteorological or geographical factors affecting the human body (comfort and disease) are discussed separately: radiation of different wave lengths, temperature, wind and humidity or cooling power, precipitation, electrical and chemical composition of air, altitude, continentality, fronts, föhn, mistral, etc.; research in German speaking countries and the U. S. and international interest or lack of interest (IMO. CCl had a Sub-Commission on Medical Meteorology set up at the Salzburg meeting in 1937) are mentioned. A few suggestions for future activity, such as in radiation research or in establishing a network of bioclimatic stations, are made. *Subject Headings:* **1. Bioclimatic research 2. Medical meteorology.**—*M.R.*

6.8–323 551.586:633.16

Grafius, J. E. and Dirks, V. A., **Climatic adaptation in a barley breeding program.** *Agronomy Journal*, 46(1):1–14, Jan. **1954.** 5 figs., 2 tables, 4 refs. **DLC**—In order to calculate the average daily rainfall available for barley varieties with different maturities, a theoretical second degree regression equation was constructed on the basis of the following assumptions: (1) the tendency of water to evaporate does not differ greatly between May and June; (2) major moisture requirements occur during the grand period of growth which lasts from floral initiation to about one week after heading; (3) the severity of insect and diseases does not differ in early and late maturing varieties and (4) an excess of soil moisture exists on May 14. It is shown that barley varieties can be too early to utilize efficiently the available moisture. Barley varieties with a maturity similar to Trebi C.I.986 would utilize efficiently the average moisture of central South Dakota. *Subject Headings:* **1. Barley ecology 2. Soil moisture requirements 3. Agricultural meteorology.**—*I.L.D.*

UPPER AIR CLIMATOLOGY

6.8–324 551.587:629.13(265/6)

U. S. Air Weather Service, **Weather conditions on a northern and a central Pacific air route.** *U. S. Air Weather Service, Special Study*, No. 105-43, Oct. **1950.** 9+p. 9 figs. Photostat. **DWB**—A brief graphical and tabular analysis of weather conditions from McChord Field (Tacoma) Wash., to Japan via Hawaii, Wake and Iwo Jima on the one hand and via Anchorage and Shemya on the other. Emphasis is on ceiling and visibility conditions at terminals and on tail (or head) wind components along the various sectors of the route. Typical weather situations or conditions at each season are described. *Subject Headings:* **1. Aeronautical climatology 2. Ceiling and visibility data 3. North Pacific air routes.**—*M.R.*

ENVIRONMENTAL INFLUENCES

6.8–325 551.588.6:551.584.3

van Eimern, Josef, **Beeinflüssung meteorologischer Grössen durch ein engmaschiges Heckensystem.** [The influence of a close system of hedges on meteorological elements.]

Annalen der Meteorologie, 6(7/8):213–219, **1953/54.** fig., 5 tables, 5 refs. German and English summaries p. 213. **MH-BH**—The meadow-land on the Weser south of Nienburg has a series of hedges 1.2–3 m high about 28 m apart running NNE–SSW and another hedge at right angles. Observations were made in Aug. 1951 at a number of points. With calm or light wind, temperature and evaporation were highest and relative humidity lowest on the sunny side of the hedges, the difference decreasing with overcast sky and strong W wind. Near the hedges the grass was thicker than 12 m away. Minimum temperature was highest near the hedges, especially on areas with short thin grass, and slightly lower between the hedges than in open spaces. Dew was heaviest away from the hedges but evaporated more quickly after sunrise. *Subject Headings:* **1. Field microclimatology 2. Germany.**—*C.E.P.B.*

6.8–326 551.588.7:551.593.1:522.

Schmeidler, F., **Über eine Storung der astronomischen Refraktion durch die abendliche Wärmestrahlung eines Gebäudes.** [On a disturbance of astronomical refraction by the evening heat radiation of a building.] *Meteorologische Rundschau*, 8(1/2) 10–12, Jan./Feb. **1955.** table, 3 eqs. **MH-BH**—The effect of a warm building, which cools more slowly than the air in the evening, on the refraction is confirmed by observations at Munich 1941–53. Monthly values of the constants in an expression for the excess temperature are determined and discussed. *Subject Headings:* **1. Atmospheric refraction correction tables 2. Building influences.**—*C.E.P.B.*

SYNOPTIC CLIMATOLOGY

6.8–327 551.58

Dean, Gordon A., **A synoptic explanation of the climatological divisions in the Central Pacific during the October season.** California. Univ. at L. A. Institute of Geophysics Oahu Research Center, Contract AF 19(604)-546, Scientific Report, No. 7, Nov. **1954.** 16 p. 9 figs., 2 tables, 15 refs. **DWB**—An explanation is offered for the climatological divisions of the Central Pacific during the Oct. season in terms of synoptic weather disturbances. Emphasis has been placed on the climatic elements, the field of motion and composition, because the variation in the combination of these two elements is the basis for the climatic divisions. The climatic elements, temperature and pressure, have not been treated because of their uniformity throughout the region. *Subject Headings:* **1. Synoptic climatology 2. Central Pacific.**—*Author's abstract.*

6.8–328 551.58

Vowinckel, E., **Synoptische Klimatologie vom Gebiet Marion Island.** [Synoptic climatology of Marion Island Region.] *South Africa, Weather Bureau, Notos*, 3(1):12–31, 1954. 11 figs., 9 tables. **DWB**—The seasonal frequency of seven characteristic weather situations is given, which are described in detail with sample maps. The mean duration of a single weather situation is only 1.63 days, of an air mass only 1.42 days. The sequence of situations is analyzed and some singularities are suggested. The air masses are characterized by the dew point outlining the typical weather conditions for each type. Front statistics are given as well as monthly averages of climatic data. *Subject Headings:* **1. Synoptic climatology 2. Weather conditions 3. Air masses 4. Marion Island, South Indian Ocean.**—*A.A.*

6.8–329 551.589.5

Enger, Isadore (*U. S. W. B.*), **Month-to-month persistence.** *American Meteorological Society, Bulletin*, 36(1):36–37, Jan. **1955.** 2 figs., 3 refs. **MH-BH**—The author obtained a month-to-month persistence of temperature and precipitation by computing the correlation between the successive months and compared the results with those obtained by Namias (*see item* 4.6–228, June 1953, *MAB*) who used as a measure of persistence the proportion of the United States in which the anomaly class changed only slightly or not at all. The similarity between the curves of the plotted data is discussed. *Subject Headings:* **1. Persistence 2. Climatic anomalies.**—*I.L.D.*

MISCELLANEOUS

COSMIC INFLUENCES

See also: **Lunar variations** (Chapman), 6.8–134; **Lunar influences** (Eyfrig), 6.8–138; **Lunar effects** (Harnischmacher), 6.8–148; **Ionospheric observ.** (Nakata), 6.8–174; **Upper winds** (Liller, Whipple), 6.8–266.

6.8–330 551.590.24

Schindler, Gerhard, **Meteorologische Beobachtungen bei der totalen Sonnenfinsternis am 30. Juni 1954 am Südausgang des Oslo-Fjords.** [Meteorological observations during the total eclipse of 30 June 1954 at the southern exit of Oslo Fjord.] *Annalen der Meteorologie*, 6(7/8):252–256, **1953/54.** fig., 16 refs. **MH-BH**—Meteorological observations of the German party on Galtö Island in the Skagerrak. A figure shows the free solar surface, illumination, UV radiation, black-bulb and air temperature, and relative humidity. Air temperature and humidity varied only slightly; no "eclipse wind" was observed. Remarks are also given on the corona, radio reception, etc. *Subject Headings:* **1. Solar eclipse effects 2. Galtö Island, Skagerrak.**—*C.E.P.B.*

6.8–331 551.590.25:551.594.7:621.396

Hartsfield, W. L. (*Central Radio Propag. Lab., Natl. Bur. of Standards, D. C.*), **Observations of distant meteor-trail echoes followed by ground scatter.** *Journal of Geophysical Research*, 60(1):53–56, March **1955.** 3 figs., table, 3 refs. **DWB**—Observations of backscatter of 13.7 Mc over a southeasterly path from Sterling, Virginia, revealed the existence of meteor-trail reflections just ahead of the main body of the backscatter, demonstrating that the latter was from the ground in these instances. The existence of apparent two-hop backscatter without the appearance of one-hop was noted in a number of cases. Possible reasons for this behavior are discussed. *Subject Headings:* **1. Radio meteor echo soundings 2. Meteor echoes 3. Radio wave reflection.**—*Author's abstract.*

VISIBILITY

See also: **Visibilty measurem.** (Petit, Tassëel), 6.8–105; **Ceiling and visibility forecasting,** 6.8–116.

6.8–332 551.591:629.13

Perlat, A., **Visibilité et hauteur de la base des nuages, 1, Problèmes des mesures résolues ou á résoudre sur les aérodromes.** [Visibility and height of cloud bases, Pt. 1, Problems resolved or to be solved at airports.] *La Météorologie*, Paris, Ser. 4, No. 33:9–18, Jan./March **1954.** 3 figs., eqs. French, English and Italian summaries p. 9. **MH-BH**—An analysis of the meteorological information needed for successful landings and the actual methods employed at airports. The author discusses the problems of horizontal and oblique visibility and various methods of measuring visibility, including establishment of visible references and determination of the maximum distance at which they can be distinguished, instrumental measurement and measurement of oblique visibility with reference to height of cloud ceilings. *Subject Headings:* **1. Visibility 2. Visibility measurement techniques 3. Aeronautical meteorology.**—*I.L.D.*

6.8–333 551.591:551.501.1

Sytinskaia, N. N., **O nekotorykh parametrakh zritel'nykh funktsiĭ.** [Some parameters of visibility functions.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 1:83–86, **1954.** 2 tables, 5 refs. **DLC**—The problem of measuring and calculating the visibility of distant objects is examined from the psychophysiological point of view. The author discusses (1) the law of V. V. Sharonov which states that the relation between the minimum distinguishable difference of brightness and the brightness of the field of adaptation is a constant magnitude and (2) the formula of N. G. Boldyrev according to which the product of the threshold of contrast visibility (ϵ) and the angle (ω) at which the object is seen is a constant magnitude.

A method is proposed for determining the threshold of contrast sensitivity of small objects of any shape. *Subject Headings:* **1. Visibility 2. Contrast threshold 3. Visibility measurement techniques.**—*I.L.D.*

6.8–334 551.591.3(421)

Bonacina, L. C. W., **Summer visibility across London from Hampstead.** *Weather*, 10(4):120–125, April **1955. DWB** –Observations of visibility from Hampstead on scale 1, St. Paul's (4 mi) not visible to 5, North Downs (20 mi) very clear, are related to wind and weather. *Subject Headings:* **1. Visibility 2. London.**—*C.E.P.B.*

OPTICAL PHENOMENA

See also: **Height of Mt. Everest** (de Graaf-Hunten), 6.8–23; **Properties of upper atmos.** 6.9–93; **Polariz. measurem.** (Kilpatrick), 6.8–157; **Astronomical refraction** (Schmeidler), 6.8–326.

6.8–335 551.593.63

Sandner, Werner (*Munich*), **Der Jahresgang der Halo-Häufigkeit in verschiedenen Breiten und Klimazonen.** [Annual cycle of halo frequency in different latitudes and climatic zones.] *Zeitschrift für Meteorologie*, 8(6):177–179, June **1954.** 3 tables. **MH-BH**—Statistical data on the mean monthly (25-year mean) number of days with halos in Europe, on the annual variation of halo frequencies at 25 localities over the globe and on the frequency of the annual principal and secondary maxima in the individual months. It is concluded that the frequency of halo days is manifested at almost all localities; distinct maxima in the spring and fall months and minima in the summer and winter months. *Subject Headings:* **1. Halo frequencies 2. Europe.**—*I.L.D.*

6.8–336 551.593.653

Grishin, N. I., **O strukture serebristykh oblakov.** [Structure of noctilucent clouds.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:23–28, Jan./Feb., **1955.** 6 photos, 3 refs. **DWB**—On the basis of photographs of noctilucent clouds made during 1948–51 and of published data the author attempts a morphological classification of these clouds. The following types are described: crepe, ships, scallops and whirls. Each type is composed of several groups. Photographs of noctilucent clouds are reproduced. *Subject Headings:* **1. Noctilucent clouds 2. Cloud structure 3. Cloud photographs.**—*I.L.D.*

6.8–337 551.593.7:551.593.653

Wörner, H., **Leuchtende Nachtwölken und Störungen der Himmelspolarisation.** [Noctilucent clouds and disturbances of sky polarization.] *Zeitschrift für Meteorologie*, Berlin, 8(6):183–184, June **1954.** fig., 7 refs. **MH-BH**—Measurements of maximum polarization at Gotha for May–June 1953 are presented graphically. The anomaly occurring on July 3–4 was associated with noctilucent clouds. Other instances of this phenomenon are cited. *Subject Headings:* **1. Noctilucent clouds 2. Polarization 3. Gotha, Germany.**—*I.L.D.*

ELECTRICAL PHENOMENA

See also: **Proceedings of Conf. on Radio Met.,** 6.8–2; **Solar noise outburst** (Hartz), 6.8–20; **Ionosph. absorption** (Argence, Rawer), 6.8–123; **Charge density in ionosph.** (Berning), 6.8–127; **Ionosph. disturbance** (Fukushima), 6.8–143; **Ion composition** (Johnson, Meadows), 6.8–153; **Recomb. models** (Kim, Dickerman), 6.8–158; **High freq. propag.** 6.8–176; **Electron density** (Seddon), 6.8–185; **Radio propag.** (Wiesner), 6.8–193; **Meteor-trail echo** (Hartsfield), 6.8–331; **Ionosph. winds** (Yerg), 6.8–196.

6.8–338 551.594.13:551.510.53

Stergis, C. G.; Coroniti, S. C.; Nazarek, A.; Kotas, D. E.; Seymour, D. W. and Werme J. V., **Conductivity measurements in the stratosphere.** *Journal of Atmospheric and Terrestria Physics*, 6(5):233–242, May **1955.** 7 figs., table, 5 refs., 8 eqs. **DWB**—Observations o

conductivity, temperature and pressure were made by radiosonde at Alamogordo, New Mexico. Two flights to a height of 90,000 and 100,000 ft are described. Temperature minimum was 200°K at 55,000 ft. Negative conductivity increased rapidly with height; the ascent curve showed marked fluctuations which are instrumental; the descent curve (by parachute) was smooth, and agrees with the curve expected from cosmic ray data (rate of production of ions, mobility and recombination). No indication was found of a diminution of conductivity at 65,000 ft due to Aitken nuclei. *Subject Heading:* **1. Electrical conductivity in stratosphere.**—*C.E.P.B.*

6.8–339 551.594.14:551.510.42:662:539.1

Gabites, J. F. (*Met. Off., Wellington, N. Z.*), **Drift of radioactive dust from the British nuclear bomb tests in October 1953.** *New Zealand. Meteorological Office, Meteorological Office Note*, No. 40, **1954.** [6 p.] 4 figs., 7 refs. **DWB.** Also in: *New Zealand Journal of Science and Technology, Sec. B*, 36(2):160–165, Sept. **1954. DLC**—Radioactive dust detected at Wellington, N. Z., just 30 hours and again 38 to 54 hours after the Woomera, S. Australia, (Oct. 1953) atomic test explosion, could not have been carried by direct air trajectories but must have followed isentropic surfaces starting at >20,000 ft, and have fallen out over New Zealand at a rate much faster than theoretically possible. The calculations and charts showing trajectories are included. Vertical cross section shows possible diffusion pattern from 3200 isentropic surface over Woomera to the surface at Wellington. How the dust got to the 320° isotherm when the cloud top was observed at 10,000 ft over Woomera, and how the first wave of dust got to N. Z. in 30 hours is still a mystery. *Subject Headings:* **1. Radioactive fallout 2. Isentropic dust trajectories 3. Atom bomb tests 4. Woomera, South Australia 5. Wellington, New Zealand.**—*M.R.*

6.8–340 551.594.14:662:539.1

Garrigue, Hubert, **Sur la radioactivité de l'atmosphère d'origine atomique.** [Atmospheric radioactivity of atomic origin.] *Académie des Sciences, Paris, Comptes Rendus*, 240(2):178–180, Jan. 10, **1955.** 5 refs. **DWB**—Air-borne radioactivity detector systematically used in France since 1946 and improved in the summer of 1954 is described, and the positive results obtained on Oct. 13, 1954 (3000 m height) and analysis of radioactive snow (or rain) on Dec. 6, 1954 are set forth along with the meteorological conditions and upper air circulation preceding the detection of these traces of radioactivity. Types of radioactivity and time involved are specified. *Subject Headings:* **1. Radioactivity of snow 2. Air-borne radioactivity detectors 3. Radioactivity of the atmosphere 4. France.**—*M.R.*

6.8–341 551.594.14:551.594.13:551.510.42:662:539.1

Harris, D. Lee (*U. S. W. B., Wash. D. C.*), **Effects of radioactive debris from nuclear explosions on the electrical conductivity of the lower atmosphere.** *Journal of Geophysical Research*, 60(1):45–52, March **1955.** 4 figs., 12 refs., 2 eqs. **DWB**—An increase in the ionization near the ground due to the fall-out from a radioactive cloud formed by a nuclear explosion will increase the conductivity and lower the potential gradient in the lower atmosphere. Records of atmospheric conductivity and potential gradient from the Tucson Magnetic Observatory are compared with records of the deposition of atomic debris on the ground following the Nevada test. The observed changes are not inconsistent with values computed from theoretical considerations. Most of the effects are confined to a very shallow layer, within a few meters of the ground. (*See also item* 6.8–342.) *Subject Headings:* **1. Radioactive fallout 2. Electrical conductivity of air 3. Potential gradient 4. Thermonuclear explosion effects.**—*Author's abstract.*

6.8–342 551.594.14:551.515:662:539.1

Machta, L. and Harris, D. L. (*U. S. W. B., Wash., D. C.*), **Effects of atomic explosions on weather.** *Science*, 121(3134):75–81, Jan. 21, **1955.** 6 figs., 14 refs. **DWB**—Various suggested mechanisms by which atomic explosions might influence weather have been reviewed. They include such hypotheses that the atomic debris might serve as a cloud seeding agent, that the radioactive nature of the debris might change the electric conductivity of free atmosphere, that the dust resulting from atomic explosion might obscure the solar radiation

and that the energy of the explosion might affect significantly the weather beyond the testing location. No theoretical reason has been found for believing that the above mechanisms could alter the weather significantly more than a few miles from the explosion site. Increase of tornadoes in 1953 was a reflection of greater accuracy in tornado statistics. Temperature and precipitation anomalies fail to show any relationship to atomic explosions. *Subject Headings:* **1. Atomic explosion effects 2. Radioactive fallout 3. Weather control.**—*I.L.D.*

6.8–343 551.594.14:662:539.1

Martin, Charles-Noel, **Sur les effets accumulatifs provoqués par les explosions thermonucléaires à la surface du globe.** [On the cumulative effects of thermonuclear explosions on the surface of the globe.] *Académie des Sciences, Paris, Comptes Rendus*, 239(20):1287–1289, Nov. 15, **1954.** refs. **DWB.** Review in: *Time*, 64(25):66–67, **1954.** port. **DLC**—Possible chemical, climatic, radioactive and genetic effects of thermonuclear explosions are discussed. The following effects are suggested as being measurable: (1) variations in pH content of rain water (limited in space and time), (2) a marked increase of atmospheric C14, (3) a (probably weak) increase of secondary cosmic radiation at sea level, (4) decrease of solar radiation intensity, (5) world-wide rainfall anomalies, (6) changes in the absorption band of nitric acid in the airglow spectrum and (7) presence of a large quantity of radioactive elements in the atmosphere. Some of these phenomena are irreversible and will become harmful after a certain threshold is reached, possibly with less than a hundred explosions. *Subject Headings:* **1. Thermonuclear explosion effects 2. Radiation effects 3. Radioactivity of the atmosphere.**—*G.T.*

6.8–344 551.594.14:662.2:539.1

Mason, B. J., **Atomic explosions and the weather.** *Weather*, 10(5):139–141, May **1955. DWB**—The energy liberated by a hydrogen bomb is very small compared with that involved in natural storms and occasional thermo-nuclear explosions are very unlikely to have more than local and transient effects on the weather. *Subject Heading:* **1. Atomic explosion effects.**—*C.E.P.B.*

6.8–345 551.594.21:523.8

Bruce, C. E. R., **Stellar thunderstorms.** *Royal Meteorological Society, Quarterly Journal*, 81(348):265, April **1955.** 3 refs. **DWB**—It is suggested that other materials besides water (chiefly carbon and the oxides of zirconium and titanium) may cause electrical discharges on freezing. This may account for the pulsatory process of electrification observed in certain stars. *Subject Heading:* **1. Stellar thunderstorms.**—*C.E.P.B.*

6.8–346 551.594.221

Hacking, C. A. (*Univ. of Witwatersrand, Johannesburg, South Africa*), **Observations on the negatively-charged column in thunderclouds.** *Journal of Geophysical Research*, 59(4):449–454, Dec. **1954.** 2 tables, 4 refs., 3 eqs. **MH-BH**—Simultaneous observations at three stations of the field-changes due to lightning discharges to ground have been used to obtain information on the negatively-charged column of MALAN and SCHONLAND. It is found that successive strokes come from regions of increasing height, but that there are occasional considerable horizontal displacement as well. The axis of the column is frequently displaced by several kilometres from the point of emergence of the flash from the cloud. *Subject Headings:* **1. Thundercloud electrification 2. Lightning discharges.**—*Author's abstract.*

6.8–347 551.594.221

Pierce E. T., **Electrostatic field-changes due to lightning discharges.** *Royal Meteorological Society, Quarterly Journal*, 81(348):211–228, April **1955.** 10 figs., 3 tables, 18 refs., 3 eqs. Also his: **The development of lightning discharges.** *Ibid.*, 81(348):229–240, April **1955.** 35 refs., 5 eqs. **DWB**—First article: Field changes due to flashes within clouds are all slow (0.25 sec or more) and slow changes also occur in strokes to ground. These were investigated with a capillary electrometer at Cambridge, England. The magnitude of the field-change (+ or −) for distances of 25–250 km is inversely proportional to the cube of the distance. Cathode ray oscillographs showed a sharp distinction between slow and rapid changes; typical

examples are shown. The mean duration of slow negative changes is 245 msec and of slow positive changes 145 msec. Complex changes are described in detail. Frontal storms produce a larger proportion of negative field changes and probably more multiple flashes than heat storms. It is estimated that 39% of flashes in an average storm are to earth. Second article: The interpretation of the investigations of electrostatic field changes due to lightning flashes, described in the first article, is discussed. "It is found that almost all the recorded field-changes can be most simply explained in terms of leaders carrying negative charge and originating in the lower part of a thundercloud. Those that reach the ground are succeeded by return strokes. It is considered that both leaders and return strokes consist of a central core surrounded by an envelope of corona; this corona concept, originally advanced by BRUCE, leads to a coherent picture of the phenomena observed." Leaders carrying a positive charge, which are rare, probably originate in the upper part of the cloud. *Subject Heading:* **1. Lightning discharges 2. Lightning field changes 3. Cambridge, England.**—*C.E.P.B.*

AURORAS

6.8–348 551.594.5:551.594.7

Bowles, K. L. (*Geoph. Inst., Univ. of Alaska*), **Doppler shifted radio echoes from aurora.** *Journal of Geophysical Research*, 59(4):553–555, Dec. **1954.** fig., 5 refs. **MH-BH**—A brief report on observations and discoveries regarding the Doppler shift in radio echoes from the aurora using 25.4 Mc/sec C.W. or pulse signals from a 100 watt transmitter located 15 mi from a low-gain receiving antenna pointed N. The spectrum of the Doppler shifted auroral echo and *fo* signal from transmitter obtained at College, Alaska, Oct. 24, 1954 is reproduced. Doppler shifts cannot be attributed to horizontal movements. Upward shifts correlate with homogeneous auroral forms; (downward motion) and downward shifts with raus (upward motion). Velocities along lines of force are calculated to be about 6 km/sec which is much less than Meinel reports obtaining from optical methods. *Subject Headings:* **1. Radio echoes from auroras 2. College, Alaska.**—*M.R.*

6.8–349 551.594.5:551.594.7

Bullough, K. and Kaiser, T. R., **Radio reflections from aurorae, pt. 2.** *Journal of Atmospheric and Terrestrial Physics*, 6(4):198–214, April **1955.** 18 figs., table, 11 refs. **DWB**—Observations of auroral echoes 1949–53 on a beam directed 68°W of N of Jodrell Bank are attributed to large single blobs or localized aggregates. There was a marked fall of activity in 1952–3 with decrease of sunspot activity. Echoes without discrete structure occur mainly between 16 and 21 h, those with discrete structure between 18 h and 6 h. Annual variation shows a slight maximum in July–Oct. Geomagnetic locality, correlation with visual aurora and with magnetic activity are discussed. Evening echoes (13–21 h) moved westward, speed at 15 h being 600 m/s to west, night-morning echoes (22–6 h) moved eastward, speed being 600 m/s to east at 5 h. At 21 h, when echoes are at a minimum, mean speed is zero. (For Pt. 1, *see item* 6.2–330, Feb. 1955, *MAB*.) *Subject Heading:* **1. Radio echoes from aurora.**—*C.E.P.B.*

6.8–350 551.594.5:551.521.61

Chamberlain, J. W.; Fan, C. Y. and Meinel, A. B. (*Yerkes Observ.*), **A new O_2 band in the infrared auroral spectrum.** *Astrophysical Journal*, 120(3):560–562, Nov. **1954.** 2 figs., table, 9 refs. **DLC**—A strong, but heretofore undetected, auroral emission has been identified as the 1–1 band of the forbidden atmospheric system of O_2. Only transitions from $v'=0$ have been previously observed in auroras. The degree of excitation in the rotational and vibrational levels of the upper electronic state is discussed. *Subject Headings:* **1. Auroral spectra 2. Infrared auroral emissions.**—*Authors' abstract.*

6.8–351 551.594.51

Hunten, D. M. and Shepherd, G. G., **Vibrational temperatures from second positive bands.** *Journal of Atmospheric and Terrestrial Physics*, 6(1):64–66, Jan. **1955.** 2 tables, 7 refs. **DWB**—The measurement of relative intensities and the derivation from them of vibrational temperature in the second positive band system of N_2 are discussed. It is concluded that measure-

ments may be confined to the $\Delta v = 2$ sequence in the near-ultraviolet. A rather large number of measurements made with a photoelectric spectrometer are shown to lead to a vibrational temperature between zero and 1000°K; it is inherently impossible to distinguish any temperature in this range. The vibrational temperature therefore does not disagree with the kinetic temperature. Measurements by some other workers are briefly discussed. *Subject Heading:* **1. Auroral spectra.**—*Authors' abstract.*

6.8–352 551.594.51:551.521.7

Landseer-Jones, B. C., **The significance of a nonterrestrial magnetic field in neutral stream theories of the aurora.** *Journal of Atmospheric and Terrestrial Physics*, 6(4):215–226, April **1955.** 7 refs., 12 eqs. **DWB**—The possibility that the existence of a nonterrestrial magnetic field in a neutral stream of ions, travelling from the sun with a speed of 10^8cm/sec, would remove a serious difficulty in the way of explaining aurorae by means of the stream when there is no such field, is examined. The analysis, which is intended to be exhaustive, leads to a process satisfactory for this purpose and needing a field in the same direction as the earth's and of a strength not less than 10^{-4} gauss, although other considerations make 10^{-5} gauss preferable. Other processes considered, requiring field strengths of at least 10^{-7} gauss, are rejected as implying great magnetic storms throughout every auroral display. It is also shown that a stream which is flowing uniformly in a magnetic field can never move out into field-free space. *Subject Headings:* **1. Auroral theories 2. Corpuscular radiation.**—*Author's abstract.*

ACOUSTICAL PHENOMENA

6.8–353 551.596.1

Andreev, I. I., **Sluchaĭ vidimogo rasprostraneniia zvukovoĭ volny po vozdukhu.** [Occurrence of visible propagation of sound waves in the air.] *Priroda*, Moscow, 43(4):112–113, April **1954. DLC**—The reported occurrence was observed by the author in East Prussia during the 2nd World War. Author describes the sudden appearance on April 17, 1945, of a huge column of black smoke over the village of Fischhausen. No sound of explosion was to be heard either at the advent or during the subsequent movement of the wave. At a height of 200–250 m it took the form of a great mushroom, then the phenomenon began to disperse and spread in the air and finally emitted from its cap a circulatory air wave. The wave passed over a distance of 3–4 km in 10–12 seconds and when it reached the point where the author stood it disappeared completely. The origin of this unusual wave and its progress in the air was caused by a heavy explosion at Fischhausen. It was first observed as an optical phenomenon and only later as an acoustical phenomenon, in the form of a loud noise produced by a heavy explosion. *Subject Headings:* **1. Visible propagation of sound 2. Optical phenomena 3. Anomalous sound propagation.**—*A.M.P.*

6.8–354 551.596.1

Sretenskiĭ, L. N., **Rasprostranenie zvuka v izotermicheskoĭ atmosfere.** [Propagation of sound in an isothermal atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 2:134–142, **1954.** 2 figs., 17 eqs. **DLC**—A theoretical analysis of the acoustic field of a point source of sound propagating waves of constant frequency in an isothermal atmosphere. The potential of the acoustic field is obtained with the aid of the Fourier-Bessel Integral. Asymptotic expressions suitable for large distance from the source are derived for this potential field. These formulas are:

$$\phi = \frac{-Q}{\pi} \frac{\alpha \cos\theta}{1-\alpha\cos\theta} \frac{\mathrm{Exp}\left[-\frac{\xi}{2c^2}(\alpha-\cos\theta)\sqrt{r^2+z^2}\right]}{\sqrt{r^2+z^2}}$$

and

$$\phi = \frac{Q}{4\pi} \frac{\beta\cos\theta}{\sqrt{1+\beta^2\cos^2\theta}} \frac{\exp\left(\frac{\xi}{2c^2}\sqrt{r^2+z^2\cos\theta}\right)}{\sqrt{r^2+z^2}} \exp\left[i\left(\sigma t - \frac{\xi\beta}{2c^2}\sqrt{r^2+z^2}-\delta\right)\right]$$

Subject Headings: **1. Acoustical propagation 2. Isothermal atmosphere.**—*I.L.D.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON NUCLEI IN THE ATMOSPHERE, SECTION A (1841–1950)

By: *Nina A. (Stepanova) Zikeev*

INTRODUCTION

This is the first part of the third in a series of bibliographies on various aspects of Cloud Physics. Those already published are:

(1) **Cloud Physics** (General), Vol. 6, No. 6, June 1955.

(2) **Radar Cloud Physics Studies,** Vol. 6, No. 7, July 1955.

The present bibliography concerns:

(3) **Condensation Nuclei, Section A,** 1841–1950, Vol. 6, No. 8, Aug. 1955.

(4) **Condensation Nuclei, Section B,** 1951–1955, Vol. 6, No. 9, Sept. 1955.

Finally, the applications of the above research will be covered in

(5) **Cloud and Rain Modification,** Vol. 6, No. 10, Oct. 1955.

The subjects covered in (1), (2) and (5) have been partially covered in a previous special bibliography —that on **Cloud Physics and Rain Making,** Vol. 1, No. 3, March 1950. The above bibliographies are intended to bring the many research workers in this field up-to-date on these important phases of work.

Since the subject of **Condensation Nuclei** has been touched on only incidentally in previous bibliographies (e.g., **Atmospheric Pollution,** Vol. 1, No. 1, Jan. 1950, **Cloud Physics and Rain Making,** Vol. 1, No. 3, March 1950 and, to some extent, in the one on **Cloud Physics,** Vol. 6, No. 6, June 1955), there was such a vast amount of material to choose from that the best of it could not be covered in a single issue without exceeding our budget and time for printing and editing, so it was divided into two sections as indicated above. It can be seen that there is as much material after 1950 as there was before. In part, this results from the fact that we have been highly selective of the older material, but have tried to be quite exhaustive in coverage of recent material. Even so, there are at least 50 papers which have been read at conferences in the past two months that cannot be included because of time and space limitations.

In selecting material for this bibliography all of the aspects indicated in the following subject outline have been covered. However, the main emphasis has been on **nuclei as condensation elements,** although they are also important in studies of (a) the electrical properties of the atmosphere, (b) atmospheric pollution, and (c) characteristics of air masses, as well as in cloud physics studies.

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1841

6H–1 551.574.1

Espy, James Pollard, **The philosophy of storms.** Boston, Charles C. Little and James Brown, **1841.** 552 p. figs., map. **DLC**—The first experiments with vapor condensation which demonstrated the existence of nuclei as active atmospheric centers of condensation can be traced back to this famous work. The author was the first to observe a steadily rising dew-point temperature in a mass of air contained within a glass jar when the air had been expanded several times in succession. This experiment was later made by C. T. R. Wilson who explained Espy's findings as caused by the presence of nuclei which produced condensation at initial expansion at lower temperature. *Subject Headings:* **1. Nuclei discovery 2. Nuclei experiments.**—*N.A.S.*

1875

6H–2 551.574.1

Coulier, Paul Jean, **Note sur une nouvelle propriété de l'air.** [Note on a new property of the air.] *Journal de Pharmacie et de Chimie,* Paris, Ser. 4, 22(1):165–173, **1875.** fig. **DLC**—The first demonstration of the fact that water vapor did not condense when nuclei were absent, and thus the first discovery that nuclei in the air act as condensation factors is reported. *Subject Headings:* **1. Nuclei discovery 2. Nuclei experiments 3. Coulier theory.**—*N.A.S.*

6H–3 551.574.1

Coulier, Paul Jean, **Note sur nouvelle propriete de l'air.** [Note on a new property of the air.] **Journal de Pharmacie et de Chimie,** Paris, Ser. 4, 22(2):254–255, **1875. DLC**—Experiments on condensation were made in which inactive air was heated and rendered active. Results of these experiments disappointed the author, since he could not find proof to support his hypothesis derived from a previous experiment (*see* 6H–2), attributing the activity of the air to the presence of small solid bodies—nuclei. He concluded that his hypothesis has not been confirmed by these later experiments, and the explanation of condensation phenomena remained still to be found. This statement contributed to the fact that the discovery of condensation nuclei described by COULIER in his first paper remained practically unknown and was recognized only in 1880 when AITKEN also observed nuclei in England. *Subject Headings:* **1. Nuclei discovery 2. Coulier theory.**—*N.A.S.*

1880

6H–4 551.574.1

Aitken, John, **On dust, fogs and clouds.** *Royal Society of Edinburgh, Proceedings,* 9:14–18, Dec. 20, **1880. DLC**—Report on nuclei discovery. The author did not know about COULIER's experiments made in 1875 proving the existence of condensation nuclei, and in his conclusions proceeded only from his own experimental investigation. He found: 1) whenever water vapor condenses in the atmosphere it always does so on some solid nucleus; 2) dust particles in the air form the nuclei on which the vapor condenses; 3) if there were no dust, there would be no fog, no clouds, no mist and probably no rain (*see also* 6H–5). *Subject Headings:* **1. Nuclei discovery 2. Nuclei experiments.**—*N.A.S.*

1881

6H–5 551.574.1

Aitken, John, **Dust, fogs, and clouds.** *Nature,* London, 23:384:385, Feb. 24, **1881. DLC**—Evaluation of COULIER's (*see* 6H–2 and 6H–3) experiments on condensation phenomena and of his condensation nuclei hypothesis. The author recognized COULIER as being the first to show the important part played by nuclei in cloudy condensation of vapor. *Subject Headings:* **1. Nuclei discovery 2. Nuclei experiments 3. Coulier theory.**—*N.A.S.*

6H–6 551.574.1

Aitken, John, **On dust, fogs, and clouds.** *Royal Society of Edinburgh, Transactions,* 30:337–368, **1881.** foot-refs. **DLC**—Author states that some kinds of dust nuclei have such an affinity for water that they determine the condensation of vapor in unsaturated air, while other kinds only form nuclei when the air is supersaturated, i.e., they only form free surfaces on which the vapor may condense and prevent supersaturation. *Subject Heading:* **1. Hygroscopic nuclei.**—*N.A.S.*

1886

6H–7 551.574.1:551.574.2

Helmholtz, R., **Untersuchungen über Dämpfe und Nebel, besonders über solche von Lösungen.** [Investigations of vapors and fog, especially those from solutions.] *Annalen der Physik und der Chemie, Leipzig, Neue Folge,* 27(4):508–543, **1886.** 3 figs., tables, plate, refs., eqs. **DLC**—Experiments on vapor condensation confirmed COULIER's and AITKEN's findings that condensation occurred only in the presence of small solid particles—condensation nuclei. HCl, H_2SO_4, SO_3, H_2NO_4 and CO_2 vapors have been used as nuclei sources. *Subject Headings:* **1. Nuclei experiments 2. Sulfuric nuclei 3. Chloride nuclei 4. Ammonium hydroxide nuclei 5. Carbon dioxide nuclei.**—*N.A.S.*

1887/1889

6H–8 551.574.1:551.508.91

***Aitken, J., On the number of dust particles in the atmosphere.** (In his: **Collected Scientific Papers.** Cambridge, University Press, **1923.** No. 16:187–206. fig., table. **DLC.** Originally in *Royal Society of Edinburgh, Proceedings,* Vol. 35, **1887–1888. DLC**—Methods of counting and description of apparatus are given. Estimated numbers of particles in the air from different sources are tabulated. (For another work of Aitken publ. in 1888/89, *see* 6H–46.) *Subject Headings:* **1. Nuclei instruments 2. Nuclei sources.**—*N.A.S.*

1890

6H–9 551.574.1:551.508.91

Aitken, J., **On a simple pocket dust-counter.** (In his: **Collected Scientific Papers.** Cambridge, University Press, **1923.** No. 17:236–246. 5 figs. **DLC.** Originally in *Royal Society of Edinburgh, Proceedings,* Vol. 18, **1890/91. DLC**—Portable form of Aitken dust counter is described and detailed drawings of its parts are given. *Subject Heading:* **1. Aitken dust counter.**—*N.A.S.*

1894

6H–10 551.574.1

Aitken, John, **The cloudy condensation of steam.** *Nature*, London, 49(1267):340–341, Feb. 8 **1894. DLC**—A discussion of the effect of electrification on the condensation of a steam jet in con nection with nuclear theory. *Subject Headings:* **1. Nuclei experiments 2. Nuclei theories.**—*N.A.S.*

1895

6H–11 551.574.1:551.574.2

Wilson, C. T. R., **On the formation of cloud in the absence of dust.** *Nature*, London, 52:144 **1895. DLC**—It is found that after a comparatively small number of expansions to remove nucle by causing condensation to take place on them, there is no further condensation unless the expansion exceeds a certain definite amount. With expansion greater than this critical value, condensation invariably takes place and the critical expansion shows no tendency to rise no matter how many expansions have been made. The latest result of the ratio of the final to the initial volume when the critical expansion is just reached is 1.258. *Subject Heading:* **1. Nuclei experiments.**—*N.A.S.*

1896

6H–12 551.578.1:551.576.11:551.574.

[Abbe, Cleveland], **An experimental rainfall.** *Monthly Weather Review*, Wash., D. C., 24:373- 374, Oct. **1896.** refs. **DLC**—Quotations from a letter of L. Errera, published in *Ciel et Terre* 17:353, Aug. 1896 are discussed and results of experimental study of condensation processes and cloud formation made in the U. S. Weather Bureau are explained. Two stages of the condensation process are distinguished: 1) When air is cooled to dew point temperature condensation begins on hygroscopic surfaces, and next to this on small particles of dust, many of which are also hygroscopic and, finally, on those that are smallest, even though they be not specially hygroscopic. If cooling goes only thus far, dew, fog and cloud, but no rain, are formed. 2) If the cooling continues, then a certain critical stage is passed and the aqueous molecules begin to agglomerate without waiting for the presence of nuclei; they come together in larger drops and by a more violent process. The extent to which cooling must proceed in order that this form of condensation may begin has been investigated and it has been found that if the cooling is produced by expansion, then the amount of expansion required in order to produce the second stage of condensation is 1.258 times the expansion necessary to produce the first stage. (*Same item as* C–2, March 1950, *MAB.*) *Subject Headings* **1. Hygroscopic nuclei 2. Dust nuclei 3. Nuclei experiments. I. Errera, L.**—*N.A.S.*

6H–13 551.574.1:551.521.

Abbe, Cleveland, **Roentgen rays and cloudy condensation.** *Monthly Weather Review*, Wash. D. C., 24:167–168, **1896.** refs. **DLC**—Reviewing the work done in the field of cloudy condensation as affected by Roentgen rays, the author cites the most prominent names: Coulier of France John Aitken of Scotland, Robert, the son of Hermann von Helmholtz, and also Kiessling, both of Germany, and Carl Barus, formerly of the Weather Bureau, Washington, D. C. These scientists have shown that when moist air is cooled nearly to the dew point the aqueous vapor begins to condense by preference upon the minute solid particles which, at that time, were called "dust floating in the atmosphere," regardless of the chemical nature of these particles. Over oceans the nuclei are mostly minute crystals of salt; in tropical lands and hot countries they are the spores and cells of vegetable origin; in the smoky atmosphere of large cities they are the minute particles of carbon. The problem as to how moist air would give up its moisture if there were absolutely no nuclei on which to initiate condensation has been considered by von Bezold and modified by the author to the effect that in the ascending portion of every cloud there are regions that are supersaturated with moisture and that a strained molecular condition is thus produced that eventually and suddenly gives way, accompanied by the production of the large drops of rain and electric phenomena. Formation of cloud in the absence of dust was investigated by C. T. R. Wilson. His findings are quoted (*see* 6H–11). *Subject Headings:* **1. Sal nuclei 2. Organic nuclei 3. Nuclei experiments 4. X ray effect.**—*N.A.S.*

6H–14 551.574.1:551.521.

Aitken, John, **On some nuclei of cloudy condensation.** *Royal Society of Edinburgh, Transactions* Pt. 1, 39:15–26, **1896/97.** plate, foot-refs. **DLC**—It has been proved experimentally that hydroscopic gases when exposed to sunlight in glass vessels become charged with nuclei on which condensation takes place when supersaturation is brought about by expansion. Hygroscopic droplets are considered to be the main active nuclei for the fluid condensation of atmospheric vapor. *Subject Headings:* **1. Hygroscopic nuclei 2. Nuclei and sunshine 3. Nuclei experiments.**—*N.A.S.*

1897

6H–15 551.574.1:551.574.2

Wilson, C. T. R., **Condensation of water vapour in the presence of dust-free air and other gases.** *Royal Society of London, Philosophical Transactions, Ser. A*, 189:265–307, **1897.** 5 figs., tables, refs., eqs. **DLC**—Experiments on behavior of air saturated with aqueous vapor and allowed to expand suddenly, which were made by COULIER, AITKEN, KIESSLING and R. HELMHOLTZ, are reviewed. The author describes his own experiments and presents the results and methods of calculation. He found that when dust-free air, originally saturated with water vapor, is suddenly expanded, condensation takes place if the maximum degree of supersaturation thus produced exceeds a certain limit. Measuring the expansion by v_2/v_1 the ratio of the final to the initial volume, he found that when v_2/v_1 is less than 1.25, no condensation takes place in dust-free air. When v_2/v_1 is greater than 1.25 and less than 1.38 condensation takes place in the form of a shower called by him "rain-like condensation." If v_2/v_1 exceeds 1.38 dense fogs are produced. *Subject Headings:* **1. Nuclei experiments 2. Condensation in dust-free air.**—*N.A.S.*

1899

6H–16 551.574.1:551.594.12

Elster, J. and Geitel, H., **Über die Existenz elektrischer Ionen in der Atmosphäre.** [The existence of electrical ions in the atmosphere.] *Terrestrial Magnetism and Atmospheric Electricity*, Wash., D. C., 4(4):213–234, **1899.** 2 figs., refs., 4 eqs. **DLC**—The earliest treatise on the discovery of ions in the air as carriers of atmospheric electricity. *Subject Heading:* **1. Ion discovery.**—*N.A.S.*

6H–17 551.574.1:551.508.91

Wilson, C. T. R., **On the condensation nuclei produced in gases by the action of Roentgen rays, uranium rays, ultra-violet light and other agents.** *Royal Society of London, Philosophical Transactions, Ser. A*, 192:403–453, **1899.** 13 figs., tables, refs., eqs. **DLC**—Expansion apparatus is described and experiments on nuclei production by Roentgen rays, by sunlight, by metals in contact with the gas, by the action of ultraviolet light on a negatively electrified zinc plate and by discharge of electricity from pointed platinum wire are explained. Behavior of various kinds of nuclei in an electric field is also discussed. *Subject Headings:* **1. Artificial nuclei 2. Nuclei instruments.**—*N.A.S.*

1900

6H–18 551.574.1:551.594.12

Townsend, John S., **The conductivity produced in gases by the motion of negatively-charged ions.** *Nature*, London, 62:340–341, Aug. 9, **1900.** 2 tables. **DLC**—Author's experiments show that ions, which are produced in air by the action of Roentgen rays, will produce other ions when they move through the gas with a velocity which is small compared with the velocity of light. The new ions are produced by the collisions between negatively charged ions and the molecules of gas. *Subject Headings:* **1. Ion origin 2. Negative ions.**—*N.A.S.*

6H–19 551.574.1:551.594.12

Wilson, C. T. R., **On the comparative efficiency as condensation nuclei of positively and negatively charged ions.** *Royal Society of London, Philosophical Transactions, Ser. A*, 193:289–308, **1899.** pub. **1900.** 3 figs., table, foot-refs. **DLC**—The author made a systematic study of the relative efficiency of negative and positive ions as nuclei for condensation and found that while a cloud begins to be deposited round negative ions when the expansion is 1.25, it is not until the expansion is equal to 1.31 that the positive ions are caught by the cloud. Thus if all the particles are caught by the cloud, the number of water particles in the cloud formed with the larger expansion, when both positive and negative ions are caught, will be twice that with the smaller expansion when only the negative ions are caught. (*Same item as* C–3, March 1950, *MAB.*) *Subject Headings:* **1. Ion properties 2. Ion experiments.**—*N.A.S.*

1902

6H–20 551.574.1:551.510.42

Hartley, W. N., **On haze, dry fog, and hail.** *Royal Dublin Society, Scientific Proceedings*, Pt. 5, 9(44):547–555, Feb. **1902.** refs. **DWB**—Dust particles as nuclei for water vapor. Dry dust and wet dust described. (*Same item as* A–23, Jan. 1950, *MAB.*) *Subject Heading:* **1. Dust nuclei.**

1903

6H–21 551.574.1:551.594.12

Barus, Carl, **The structure of the nucleus.** *Smithsonian Contributions to Knowledge*, Wash., D. C., 29(1373):1–176, **1903.** 9 figs., 10 tables, subject index p. 175–176. **DLC**—Comprehensive

treatise on nuclei of various chemical and physical natures. Ionization experiments are described. The author tried to differentiate between the properties of the nucleus and the ion, presuming that the effect of temperature would present a contrast. *Subject Headings:* **1. Nuclei experiments 2. Ion properties.**—*N.A.S.*

6H–22 551.574.1:551.508.91

Owen, Gwilym, **On the condensation nuclei produced in air and hydrogen by heating a platinum wire.** *Philosophical Magazine*, London, Ser. 6, 6(33):306–315, Sept. **1903,** foot-refs., eqs. **DLC**—Experiments on nuclei production are described. In the case of air, a relation was found to exist between the expansion and the minimum temperature at which nuclei are produced which are caught with that expansion. The nuclei increased in size and number as the temperature was increased. *Subject Headings:* **1. Artificial nuclei 2. Nuclei experiments.**—*N.A.S.*

6H–23 551.574.1:551.508.91:551.594.12

Thomson, J. J., **On the charge of electricity carried by a gaseous ion.** *Philosophical Magazine*, London, Ser. 6, 5(27):346–355, **1903. DLC**—Experiments were made in order to increase the knowledge of the laws governing the deposition of the cloud round the charged ions. It was found that when the expansion of the Wilson type chamber is greater than 1.33, the number of nuclei caught by the cloud does not depend upon the amount of the expansion. When the expansion is between 1.33 and 1.29, the number of nuclei diminishes until the expansion is 1.29. The number caught is only half that at the higher expansions. For expansion greater than 1.33 all the ions, positive as well as negative, are caught by the cloud. The mean charge of the gaseous ion is found to be 3.4×10^{-10} cm. *Subject Headings:* **1. Nuclei experiments 2. Ion experiments 3. Ion charges.**—*N.A.S.*

6H–24 551.574.1:551.594.12

Townsend, John S., **The genesis of ions by the motion of positive ions in a gas, and a theory of the sparkling potential.** *Philosophical Magazine*, London, Ser. 6, 6(35):598–618, Nov. **1903.** 5 figs., 9 tables, foot-refs. **DLC**—An account of the theory of the genesis of ions and its application to experiments which have been made with air and hydrogen. The theory is founded on the determination of the conductivity which takes place between parallel plate-electrodes when ultraviolet light falls on the negative plate. By the action of the light a certain number of negative ions are set free; these generate others in their passage through the gas. *Subject Headings:* **1. Ion theories 2. Ion origin.**—*N.A.S.*

6H–25 551.574.1:551.594.12

Townsend, John S., **On the ionization produced by the motion of positive and negative ions.** *Philosophical Magazine*, London, Ser. 6, 6(33):358–361, Sept. **1903.** 4 refs. **DLC**—A discussion on the theory of ionization by collision when small electromotive forces are acting. The author answers the remarks made by STARK and reviews some work of MCCLELLAND, STOLETOW and THOMSON. *Subject Headings:* **1. Ionization by collision theory 2. Ion origin.**—*N.A.S.*

1905

6H–26 551.574.1:551.508.91:551.594.12

Barus, Carl (*Wash., D. C.*), **A continuous record of atmospheric nucleation.** *Smithsonian Contributions to Knowledge*, Wash., D. C., 34(1651):1–226, **1905.** 51 figs., tables, refs. **DWB**—A fundamental study of nuclei in the atmosphere. Experiments and observations are described. Text is divided into 9 chapters covering the following subjects: 1. Relation of ionization to nucleation in air after contact with phosphorus; 2. The relation of ionization and nucleation associated with water nuclei produced in air; 3. Preliminary survey of the apertures of coronas in relation to the number of nuclei in their sizes; 4. The number of nuclei produced by shaking different liquids, and allied experiments; 5. Diffusion of vapor into nucleated air; 6. Periodic color distribution in relation to the coronas of cloudy condensation, with a revision of the constants of coronas; 7. Direct micrometric and micro-photographic measurement of fog particles, with a summary of all relevant data; 8. The coronal method of estimating atmospheric nucleation and 9. The variation in the nucleation of the atmosphere of the city of Providence. *Subject Headings:* **1. Nuclei experiments 2. Nuclei coronas 3. Ion properties 4. Nuclei in city air 5. Providence, R. I.**—*N.A.S.*

6H–27 551.574.1:551.594

*Ficker, H. von and Defant, A., **Über den täglichen Gang der elektrischen Zerstreuung und des Staubgehaltes auf dem Patscherkofel.** [Diurnal variations of electrical scattering and of dust content in Patscherkofel.] *Akademie der Wissenschaften, Vienna, Math.-Naturwiss. Klasse, Sitzungsberichte, Abt. IIa,* 114(2):151–165, **1905.** tables, foot-refs. **DLC**—Parallel measurements of electrical scattering and Aitken nuclei content were made in the second half of Dec. 1904 at Kaiser

Franz Joseph-Schutzhaus in mountains covered with deep snow. Diurnal variations of Aitken nuclei followed the convective air stream development. Differences in diurnal variations of the positive and negative scattering resulted from descending air streams. *Subject Headings:* **1. Nuclei diurnal variations 2. Nuclei and atmospheric electricity.**—*N.A.S.*

6H–28 551.574.1:551.594.13

Langevin, P., **Sur les ions de l'atmosphere.** [Ions in the atmosphere.] *Académie des Sciences, Paris, Comptes Rendus,* 140(4):232–234, Jan. 23, **1905.** eqs. **DLC**—The earliest paper on the variety of atmospheric ions which had been discovered by ELSTER and GEITEL in 1899. It was established experimentally that along with the small ion, with a mobility of 1 cm/sec in the field of 1 volt/cm, there is another type of ion in the air with a gross mass. These large ions (Langevin ions) increase in number proportionally to the rate of air pollution and are so numerous in the atmosphere of large cities that their quantity of electricity per volume unit is 50 time larger than that of the small ions. *Subject Headings:* **1. Large ions 2. Ion mobility 3. Ion variations 4. Ion charges.**—*N.A.S.*

6H–29 551.574.1:551.508.94

Langevin, P. and Moulin, M., **Sur un enregistreur des ions de l'atmosphére.** [Recorder for ions in the atmosphere.] *Académie des Sciences, Paris, Comptes Rendus,* 140(4):305–307, Jan. 23, **1905.** eqs. **DLC**—Theoretical basis for the apparatus for continual recording of the number of ions in the atmosphere is given and its functioning is discussed. *Subject Headings:* **1. Ion recorders 2. Automatic recorders.**—*N.A.S.*

1906

6H–30 551.574.1:551.521.6

*Barus, Carl, **The nucleation of the uncontaminated atmosphere. First Report,** Carnegie Institution of Washington, Wash., D. C., Jan. **1906.** 152 p. 104 figs., 63 tables, foot-refs. **DWB**—Analysis of continuous records of nucleation of the atmosphere in a locality relatively free from the habitations of man, and hence free from nucleations of local and artificial origin, showed annual maximum in Dec. Observations were carried out in Providence and Block Island, Rhode Island. Distributions of nuclei produced by the X-ray or other radiation is studied by an objective method and the numbers and gradations of size of the efficient nuclei in dust free air, energized or not by X-ray or other radiation, are determined. Experimental study of the critical conditions in the formation of ions and of nuclei, generation and decay of nuclei, effect of large pressure differences and of nucleation due to gamma rays is made. *Subject Headings:* **1. Nuclei experiments 2. Nuclei formation 3. Nuclei decay 4. Nuclei annual variations 5. X-ray effect 6. Providence, R. I. 7. Block Island, R. I.**—*N.A.S.*

1907

6H–31 551.574.1:551.508.91

*Barus, Carl, **Condensation of vapor as induced by nuclei and ions. Second Report,** Carnegie Institution of Washington, Wash., D. C., May **1907.** 164 p. 66 figs., 55 tables, foot-refs. **DWB**—Development of a fog chamber of the simplest practical character, capacious enough to permit the measurement of the largest available coronas, was the chief purpose of this work. The author studied experimentally the distribution of nuclei within the fog chamber energized by the gamma-rays of radium and by the X-rays, the nucleation of filtered air in relation to different saturation of water vapor, the nucleation of filtered air with time, minimum of efficient nucleation and dependence of efficiency of fog chamber on the size of the exhaust pipes. Several other miscellaneous experiments are described in detail and illustrated by graphs. *Subject Headings:* **1. Nuclei instruments 2. Nuclei experiments 3. Nuclei coronas.**—*N.A.S.*

6H–32 551.574.1:551.593.64:551.508.91

Barus, C., **Über die Verteilung der Kondensationskerne in staubfreier und gesättigter Luft und über ihre Beobachtungsmethoden.** [The distribution of condensation nuclei in dust free and saturated air and their observation methods.] *Annalen der Physik,* 24:225–242, **1907.** 9 figs., refs., eqs. **DLC**—Describes experiments made only with dust free air, from which ordinary or Aitken nuclei have been removed by filtration. Instruments and techniques are described. The number of nuclei was determined from measurements of the corona of the foglike condensation at certain pressure of the saturated air. Results are presented on graphs and discussed. *Subject Headings:* **1. Nuclei coronas 2. Nuclei instruments 3. Nuclei in dust-free air.**—*N.A.S.*

6H–33 551.574.1:551.594.13:551.508.94

Langevin, M. P. and Moulin, M., **Electromètre enregistreur des ions de l'atmosphère.** [Electrometric recorder of the ions in the atmosphere.] *Le Radium,* Paris, 4(6):218–229, June **1907.** 12 figs., foot-refs., eqs. **DLC**—Complete description of the apparatus and method for recording

ions, with many drawings and photos and elaborate treatment of mathematical theory on which it is based. *Subject Headings:* **1. Ion recorders 2. Ion theories.**—*N.A.S.*

1908

6H–34 551.574.1:551.508.91:551.593.64

*Barus, Carl, **Condensation of vapor as induced by nuclei and ions. Third Report.** Carnegie Institution of Washington, Wash., D. C., **1908.** 139 p. 49 figs., 55 tables, foot-refs. **DWB**—An account of experiments made with a plug-cock fog chamber. The efficiency of this chamber and the technique of computations are described and several experimental data on nucleation constants of coronas, on distribution of vapor nuclei and ions in dust free wet air and the rate of decay of ionized nuclei are discussed. *Subject Headings:* **1. Nuclei experiments 2. Nuclei coronas 3. Nuclei decay.**—*N.A.S.*

1910

6H–35 551.574.1:551.594.13:551.593.64

*Barus, Carl, **Condensation of vapor as induced by nuclei and ions. Fourth Report,** Carnegie Institution of Washington, Wash., D. C., **1910.** 84 p. 29 figs., 25 tables, foot-refs. **DWB**—Investigations on the residual nuclei of pure water with regard to the size and persistence of such nuclei were carried out experimentally. Further experiments in a study of the optics of coronas by the electron method of standardizing the coronas of cloudy condensation in terms of the velocities of the ions are described. *Subject Headings:* **1. Nuclei size 2. Nuclei coronas 3. Ion mobility.**—*N.A.S.*

1912

6H–36 551.574.1:551.506.7

Budig, W., **Staubmessungen in freier atmosphäre.** [Dust measurements in the free atmosphere.] *Physikalische Zeitschrift*, 13(25):1224, Dec. **1912. DLC**—Nuclei count was made on a balloon flight, organized by the Berlin Verein für Luftschiffahrt on July 14, 1912. The results obtained refuted the conclusions made by A. WIGAND from observations in the balloon "Continental II." The dropping of ballast (sand) affected the nuclei count for several minutes. At a height of 4000–5200 m the nuclei count was sometimes only 100. *Subject Headings:* **1. Balloon flight observations 2. Nuclei vertical distribution 3. Berlin, Germany.**—*N.A.S.*

6H–37 551.574.1

Wigand, Albert and Schwab, Friedrich, **Über die Untersonne und den Sonnenhalo von 22° Radius, mit Messungen und photographischen Aufnahmen von Ballon aus.** [Mock sun and 22° solar halo with measurements and photographs made on a balloon flight.] *Physikalische Zeitschrift* 13(14):677–684, July **1912.** 4 figs., tables, foot-refs. **DLC**—Along with the observations of 22° solar halo made on the flight of the balloon "Continental II," observations with an Aitken dust counter were also made. The results show that when the sand ballast was dropped no effect on the dust nuclei count could be detected. This is acknowledged as proof of the fact that the solid dust particles play no role in fog formation processes. *Subject Headings:* **1. Balloon flight observations 2. Dust nuclei.**—*N.A.S.*

1913

6H–38 551.574.1:551.594.12

Wigand, Albert, **Über die Natur der Kondensationskernen in der Atmosphäre inbesondere über die Kernwirkung von Staub und Rauch.** [The nature of condensation nuclei in the atmosphere especially on the activity of dust and smoke nuclei.] *Meteorologische Zeitschrift*, Berlin, 30(1):10–18, **1913.** foot-refs. **DLC**—A comprehensive and well arranged review of the knowledge on condensation nuclei with theoretical speculations and interpretations on the nature of condensation nuclei, sources of origin, concentration factors, weather influence, charges on small ions, charges on large Langevin ions and on the absorption of the positive ions in the air by fog particles. *Subject Headings:* **1. Literature reviews 2. Nuclei source 3. Small ions 4. Large ions 5. Nuclei theories.**—*N.A.S.*

1914

6H–39 551.574.1:551.506.7

Wigand, Albert and Lutze, Georg, **Bericht über eine wissenschaftliche Freiballonfahrt bis 9425 m. Hohe.** [Report on a scientific free-balloon flight up to 9425 m.] *Beiträge zur Physik der freier Atmosphäre*, Strasbourg, 6(3):173–186, **1914.** 3 figs., 5 tables, foot-refs. **DLC**—During the flight of the balloon "Harborg III" from Halle, measurements of nuclei content were taken. Vertical distribution of nuclei is given in a table for heights from 3200 to 9000 m. Between 5100 and 9000 m, nuclei content was unmeasurably low. *Subject Headings:* **1. Nuclei vertical distribution 2. Balloon flight observations 3. Halle, Germany.**—*N.A.S.*

1916

6H–40 551.574.1:551.594.13

Kennedy, H., **The large ions and condensation nuclei from flames.** *Royal Irish Academy, Proceedings, Sec. A*, 33:58–74, **1916.** 10 figs., 5 tables, refs., eqs. **DLC**—An account of experiments carried out to obtain more information on the nature of large ions and the nuclei from which they are formed. Equations are given for the rate of decay of ionization in the case of large ions from flames and for the rate of decay of nuclei; the rate for the latter is the same whether the nuclei is charged or uncharged. The large ions do not carry a simple electronic charge but some multiple of it. The mobility of large ions, as well as the formation of nuclei, is independent of the charge. *Subject Headings:* **1. Large ions 2. Ion mobility 3. Nuclei formation 4. Charged nuclei.**—*N.A.S.*

1917

6H–41 551.574.1:551.594.12

Andren, L., **Zählung und Messung der komplexen Moleküle einiger Dämpfe nach der neuen Kondensationstheorie.** [Counting and measurement of the complex molecules of several gases according to the new condensation theory.] *Annalen der Physik*, Leipzig, 52:1–71, **1917.** 16 figs., 14 tables, refs., eqs. **DLC**—The nature and size variations of condensation nuclei are investigated in different gas mixtures. Special attention is paid to the sources of errors. It has been found that the formation of unelectrical nuclei is a function of vapor, and it is not affected by the gas itself. Size variations are continuous and dependent on the type of fluid. The biggest nuclei are the charged ones. *Subject Headings:* **1. Nuclei size 2. Charged nuclei 3. Uncharged nuclei.**—*N.A.S.*

1918

6H–42 551.574.1:551.588.7:551.591

Schmidt, Wilhelm, **Messungen des Staubkerngehalts der Luft am Rande einer Grosstadt.** [Measurements of the dust nuclei content of the air at the margin of a city.] *Meteorologische Zeitschrift*, 35:281–285, **1918.** tables. **DWB**—Numbers of nuclei per mm^3 in Vienna are tabulated for different wind directions and velocities showing ten times as many in air which has travelled across the city (S.E. winds). Measurements are compared with visibility and ozone content (negative correlation in each case). (*Same item as* 3G–43, July 1952, *MAB.*) *Subject Headings:* **1. Nuclei in city air 2. Nuclei and visibility 3. Vienna, Austria.**—*C.E.P.B.*

1919

6H–43 551.574.1:551.506.7

Wigand, Albert, **Die vertikale Verteilung des Kondensationskerne in der freien Atmosphäre.** [Vertical distribution of condensation nuclei in the atmosphere.] *Annalen der Physik*, Leipzig, 59(16):689–742, **1919.** 15 figs., tables, refs., eqs. **DLC**—A comprehensive treatise on methods and results of nuclei measurement. The laws of vertical distribution of nuclei are explained for various weather conditions. *Subject Headings:* **1. Nuclei vertical distribution 2. Nuclei counting methods.**—*N.A.S.*

1921

6H–44 551.574.1

Köhler, Hilding, **Zur Kondensation des Wasserdampfes in der Atmosphäre.** [On the condensation of water vapor in the atmosphere.] *Geofysiske Publikasjoner*, Oslo, 2(1), **1921.** 15 p. fig., 2 tables, 3 eqs. **Pt. II.** *Ibid.*, 2(6), **1922.** 53 p. 15 figs., 11 tables, plate, 11 eqs. **DLC**—Analysis of cloud drop sizes and the amount of different salts found in frost-fog probes proved that drops of different sizes in nonprecipitating clouds were developed over salt particles of various sizes. In Pt. 2 investigations on drop size distribution are presented. It has been found that certain size groups are associated with certain nuclei—for instance, drops with radius 7.10^{-4} cm contained MgNa nuclei, another group contained ammonia nuclei, etc. *Subject Headings:* **1. Nuclei size 2. Drop size 3. Salt nuclei.**—*N.A.S.*

1922

6H–45 551.574.1:551.575(91)

*Braak, Cornelius, **On cloud formation. Nuclei of condensation, haziness, dimensions of cloud-particles.** *Indonesia.* (*K.*) *Magnetisch en Meteorologisch Observatorium te Batavia, Verhandelingen*, No. 10, **1922.** 33 p. numerous tables, refs., eqs. **DWB**—Observations made in East Indies on number of nuclei of condensation found, using Aitken's dust counter. Variations with height, day and season were noted. Transformation of haze into fog, density of haze with relation to number of nuclei were discussed. Dimensions of cloud particles, factors determining size of hygroscopic particles, number of nuclei used for cloud formation, number of nuclei and density of haze and vertical distribution of nuclei during anticyclonic conditions were noted. (*Same item as* C–7, March 1950,

M.A.B.) *Subject Headings:* **1. Nuclei vertical distribution 2. Nuclei annual variations 3. Nucle and fog 4. Nuclei and anticyclones 5. East Indies.**

1923

6H–46 551.574.1:551.508.9

Aitken, John, **On improvements in the apparatus for counting the dust particles in the at mosphere.** (In his: **Collected Scientific Papers.** Cambridge, University Press, **1923.** p. 205–235 4 plates, table.) **DLC.** Originally in *Royal Society of Edinburgh, Proceedings*, Vol. 16, **1888/1889 DLC**—Improvements are described and detailed working drawings of different parts of apparatu are given. Plate 1 shows the general arrangement of different parts as fitted up for work; Plate gives detailed drawings of test receiver; Plate 3 shows the apparatus for measuring the air to b tested; Plate 4 shows the portable apparatus reduced from full size in the ratio 61–80. *Subject Headings:* **1. Aitken dust counter 2. Portable dust counters.**—*N.A.S.*

6H–47 551.574.

*Aitken, John, **On the number of dust particles in the atmosphere of certain places in Grea Britain and on the Continent with remarks on the relation between the amount of dust and meteoro logical phenomena. Pt. 1–3.** (In his: **Collected Scientific Papers.** Cambridge, University Press **1923.** p. 297–434. figs., tables.) **DLC.** Originally in *Royal Society of Edinburgh, Proceedings* 17:193–254, 1889/1890, pub. **1891.** 2 plates, tables. **DLC**—Results of a series of observations o nuclei count made with a portable counter are presented in graphs and tables and relationships t meteorological elements are interpreted. *Subject Headings:* **1. Nuclei and temperature 2. Nucle and humidity 3. Nuclei and wind.**—*N.A.S.*

6H–48 551.574.1:551.594.1

Aitken, John, **On some nuclei of cloudy condensation, (Pt. 1).** *Royal Society of Edinburgh Transactions*, 39(1):15–25, 1896/1897, pub. **1898.** plate, 3 foot-refs. **Pt. 2,** *Royal Society of Edinburgh, Proceedings*, 31(4):478–498, 1910/1911, pub. **1911.** 2 figs., 3 tables, foot-ref. **Pt. 3,** *Ibid.* 37(3):215–245, 1916/1917, pub. **1917?** 3 tables, 8 refs. **DLC.** Pt. 3 reprinted in his **Collected Scientific Papers,** ed. by Cargill G. Knott. Cambridge, University Press, **1923.** p. 545–572 **DLC**—The author states that all kinds of nuclei condense some water by their surface action unde all degrees of humidity, but the particles having an affinity for water condense very much mor and cause fog in unsaturated air. In Pt. 3, only the more common forms of nuclei are treated 1) those which have little or no chemical affinity for water and 2) those which require supersaturation to cause condensation. This investigation was undertaken because some authors stated that nucle counted by the condensation method were mostly ions or aggregations of them and not dust particles Several experiments were made in order to find verification for this ionic theory of condensation i the air, and it was found that there is no proof that ions alone can ever form nuclei large enough t cause condensation with but little supersaturation, and there is no evidence that large particles ar ever formed by the ions in the atmosphere because in pure air there are no nuclei smaller than can b brought down with a slight expansion. The experiments indicate also that what are now called large ions are nothing more than very small solid or liquid particles with an ion or ions attached *Subject Headings:* **1. Ionic theory of condensation nuclei 2. Large ions.**—*N.A.S.*

1924

6H–49 551.574.1:551.594.12:551.508.91

Nolan, J. J., **Dust in the atmosphere.** *Nature*, London, 114(2872):720–722, Nov. 15, **1924** 3 figs., ref. **DLC**—Historical review of nuclei research starting with COULIER and AITKEN's dis covery of nuclei in the atmosphere in 1880. Interpretations of terms "dust" and "large ions," their characteristics and behavior are followed by description of forms of the more important me chanical impurities in the atmosphere which were studied by the Advisory Committee on Atmospheric Pollution (London) in several places and presented in excellent photographs. *Subject Headings* **1. Dust nuclei 2. Large ions 3. Atmospheric pollutants.**—*N.A.S.*

6H–50 551.574.1:551.508.91

Owens, J. S., **The automatic measurement of atmospheric pollution.** *Nature*, London 114(2861):330–332, Aug. 30, **1924.** 2 figs. **DLC**—Comparison of the automatic filter and jet dust counter records showed that there is a reasonably constant relation between the number of particles/cm³, and the weight of impurity in mgr/m³. This indicates a tendency toward uniformity in size of the particles at different times, but there is also a definite departure from such uniformity during thick smoke haze when the average size increases, doubtless due to insufficient time for separation by settlement. The maximum diameter of smoke particles in the absence of thick smoke haze is about $1\frac{1}{2}\mu$, while during thick smoke haze the maximum reaches about 3μ (in London).

Diurnal variations of the amount of suspended impurity in the air are shown on graphs for several places. *Subject Headings:* **1. Automatic nuclei recorders 2. Jet dust counter 3. Smoke nuclei.** —*N.A.S.*

1925

6H–51 551.574.1:551.576.11

Jaumotte, J., **Un cas de sursaturation extraordinaire dans l'atmosphère libre.** [A case of extraordinary supersaturation in the free atmosphere.] *Ciel et Terre*, Brussels, 41(3):42–49, March **1925.** 3 figs., table, 2 refs. Abstracted in *Monthly Weather Review*, 53:79, **1925. DLC**—Extreme supersaturation can occur when air is completely deprived of the usual condensation nuclei. Such supersaturation is exceptional at 5–6 km but is frequent at the mean cirrus level. (*Same item as* 21–18, Sept. 1951, *MAB.*) *Subject Headings:* **1. Supersaturation 2. Nuclei and clouds.**—*N.A.S.*

6H–52 551.574.1(47)

Kalitin, N. N., **K voprosu ob opredelenii kolichestva pyli v atmosfere.** [The problem of determining the dust content in the atmosphere.] *Meteorologicheskii Vestnik*, Leningrad, No. 4:103–104, April **1925.** 3 tables. **DWB**—Nuclei count was made with Aitken apparatus in Feodossya in the summer of 1924. Maximum concentration was 114,800 during a strong wind from the steppe, and minimum 5400 in calm weather. *Subject Headings:* **1. Nuclei count 2. Nuclei and wind 3. Feodossya, U.S.S.R.**—*N.A.S.*

6H–53 551.574.1(47)

Kalitin, N. N., **Neskol'ko dannykh po soderzhaniiu pyli v vozdukhe dlia kurortov Mineral'nykh Kavkazskikh Vod.** [Some data on content of dust in the air in the Caucasus mineral water resorts.] *Kurortnoe Delo*, Moscow, 3(9/10):121–127, Sept./Oct., **1925.** 4 tables. 3 refs. **DLC**—Observations of dust nuclei content were made with a portable Aitken counter during Aug. and Sept. 1925 in Piatigorsk, Kislovodsk, Essentuki and Zheleznovodsk. Data are presented in a table along with observation of wind and cloudiness. Nuclei count was usually low. *Subject Headings:* **1. Dust nuclei 2. Nuclei count 3. Nuclei and wind 4. Caucasus mineral water resorts 5. U.S.S.R.**—*N.A.S.*

1926

6H–54 551.574.1:551.575:551.508.91

*Boylan, R. K., **Atmospheric dust and condensation nuclei.** *Royal Irish Academy, Dublin, Proceedings, Sec. A*, 37(6):58–70, **1926.** fig., 3 tables, foot-refs. **DLC**—Methods of observation of dust and nuclei amounts in the atmosphere introduced by J. S. Owens are explained and the nature of Aitken nuclei is discussed, thus clearing the confusion between meaning of "dust" and "nuclei". The author made 70 observations with Owens jet dust counter and Aitken's pocket dust counter of dust particles and nuclei in the period from Oct. 1925 to 1926 in Dublin. Three observations of dust particles were made at sea from a small steam ship. Results are given in tables. Boylan found by statistical methods that high values of dust content accompany high values of nucleus content. Rain reduced the dust content and increased slightly the number of nuclei. The highest concentrations of dust and nuclei were observed during fog. The correlation coefficient between the concentrations of dust particles and nuclei was 0.73±.056. The author concludes that dust particles will not act as nuclei of condensation even in spaces from which ordinary nuclei have been withdrawn. *Subject Headings:* **1. Nuclei and dust 2. Nuclei and rain 3. Nuclei and fog 4. Owens jet dust counter 5. Aitken dust counter 6. Dublin, Ireland.**—*N.A.S.*

6H–55 551.574.1:551.575.1

Owens, J. S., **Condensation of water from the air upon hygroscopic crystals.** *Royal Society of London, Proceedings, Ser. A*, 110:738–752, **1926.** 2 figs., 4 tables, ref. **DLC**—Describes experiments on conditions of deliquescence of crystalline salts of air, having bearing on formation of haze, fog and condensation from the air. (*Same item as* C–8, March 1950, *MAB.*) *Subject Headings:* **1. Salt nuclei 2. Crystalline nuclei 3. Nuclei and fog 4. Nuclei experiments.**

1927

6H–56 551.574.1:551.594.12

MacLaughlin, P. J., **Mesures sur les gros ions à Paris.** [Measurements of large ions in Paris.] *Académie des Sciences, Paris, Comptes Rendus*, 184(20):1183–1185, May 16, **1927.** 2 figs., 3 refs. **DLC**—Results of observations made in 1925, confirming in general the views of Langevin, are presented in graphs showing diurnal variation of large ion counts and relationship between the numbers of large ions and distribution of smokestacks in Champ-de-Mars. *Subject Headings:* **1. Large ions 2. Ion variations 3. Champ-de-Mars, France.**—*N.A.S.*

1928

6H–57 551.574.1:551.594.1

*MacLaughlin, P. J., **Recherches sur les gros ions.** [Investigations on large ions.] *Paris Université. Institut de Physique du Globe, Annales*, 6:60–85, **1928.** 13 figs., 8 tables, foot-refs. eqs. **DLC**—In a brief survey of the preceding experimental studies of large ions (*see item* 6H–56 the names, places, years and the number of observations are cited. Methods of measurement and drawing of the apparatus used by the author with complete information about the etalons, precisio rates, etc. are given. Results of investigations are presented in graphs showing the variations o ion count during rainfall, during clear morning sky, comparing the variation in number of positiv and negative ions, diurnal variation of large ions and the relation of ion count to combustion in th atmosphere. Relationship to meteorological elements is discussed and characteristic data tabulated *Subject Headings:* **1. Large ion origin 2. Nuclei instruments 3. Positive ions 4. Negative ion 5. Large ion variations.**—*N.A.S.*

1929

6H–58 551.574.1:551.510.42:551.578.1(42

Ashworth, J. R., **The influence of smoke and hot gases from factory chimneys on rainfal** *Royal Meteorological Society, Quarterly Journal*, 55:341–350, **1929.** 3 figs., 4 tables. **DLC**—Study of industrial smoke and dust particles as nuclei for water vapor, creating rain in Rochdale, England (*Same item as* A–28, Jan. 1950, *MAB.*) *Subject Headings:* **1. Smoke nuclei 2. Dust nuclei 3. Nu clei and rain 4. Rochdale, England.**

6H–59 551.574.1:551.594.1

Builder, Geoffrey, **The effect of condensation nuclei in atmospheric electrical observations** *Terrestrial Magnetism and Atmospheric Electricity*, Wash., D. C., 34(4):281–286, **1929.** fig., table refs., eqs. **DLC**—Observations made at the Watheroo Magnetic Observatory are used for showing the relationships found between the counts of atmospheric nuclei and the simultaneous values o the atmospheric conductivity and potential gradient. An approximately linear relation was found and is presented in curves. SCHWEIDLER's equation of recombination is used for computing an approximate and nonlinear extrapolation of the curve of reciprocals of negative conductivity against nuclei count. *Subject Headings:* **1. Nuclei and atmospheric electricity 2. Nuclei and potentia gradient 3. Nuclei-ion combination 4. Watheroo Magnetic Observatory, Australia.**—*N.A.S.*

6H 60 551.574.1:551.594.1

Hess, Victor F., **Neue Untersuchungen über die Ionisierungsbilanz der Atmosphäre auf Helgo land.** [New investigations of the ionization balance of the atmosphere over Helgoland.] *Beiträg zur Geophysik*, 22(3):256–314, **1929.** figs., 19 tables, 24 refs., eqs. **DLC**—All atmospheric electri elements which are of importance for the equilibrium of ionization were measured on the North Cape of Helgoland island in the North Sea, on a cliff 50 m above sea level. The measured element were: the diminution constant—B and the average life—D of small ions, their number (n), th number of large ions (N), the number of nuclei (Z), and the number of uncharged nuclei (N_0). Inter-relationships between these elements was investigated and it is found that $\frac{N_0}{N}=2.24$. Variou correlations with meteorological factors have been carried out and results are presented in table and equations. Daily observation data are given in table a for the period from Aug. 2 to Sept. 8 1928. *Subject Headings:* **1. Ionization equilibrium 2. Nuclei-ion combination 3. Nuclei and win 4. Nuclei and visibility 5. Nuclei and cloudiness. 6. Helgoland**—*N.A.S.*

6H–61 551.574.1:551.594.12(431/5

*Israel, J., **Untersuchungen über schwere Ionen in der Atmosphäre.** [Investigations of the heavy ions in the atmosphere.] *Beiträge zur Geophysik*, 23:144–166, **1929.** 9 figs., 7 tables, 1 refs. **DLC**—Daily measurements of large and small ions, with positive and negative charges were made in Frankfurt a/M., Germany during Feb.–May 1929, along with observations of meteorological elements and air mass identification. Methods used for counting the heavy ions (Langevin ions) and for determining their mobility rate are given and illustrated by drawings and photos. Statistical analyses of combinations and of relationships to meteorological factors show that N/n (large ions to small ones) is 15; N^0/N (Aitken nuclei to large ions) is 6–7, so that 15% of the condensation nuclei are charged (NOLAND's figure is 1.26 and GOCKEL's is 2–3). Polar air has fewer ions than Tropical air. *Subject Headings:* **1. Large ions 2. Small ions 3. Nuclei-ion combination 4. Nuclei and air masses 5. Frankfurt a/M., Germany.**—*N.A.S.*

6H–62 551.574.1:551.594.12

Nolan, P. J., **The law of recombination of ions.** *Royal Irish Academy, Proceedings, Sec. A*, 38:49–59, **1929.** figs., 4 tables, refs., eqs. **DLC**—Equation showing the relationship between the

rate of production of ions in atmospheric air and the equilibrium concentrations of ions and nuclei is derived from experiments with air in a closed vessel. The recombination coefficient between small ions and nuclei varies inversely to the square root of the nucleus concentration. *Subject Heading:* **1. Nuclei-ion combination.**—*N.A.S.*

6H–63 551.574.1:551.591

Wait, G. R., **Are the Aitken nuclei hygroscopic particles?** *Carnegie Institution of Washington, Year Book*, No. 28:269–270, 1928/1929. 2 refs., eq. **DLC**—Relationship between visibility, relative humidity and nuclei count is discussed in order to find proof of the hygroscopic nature of Aitken nuclei. Inconclusive. *Subject Headings:* **1. Hygroscopic nuclei 2. Nuclei and visibility 3. Nuclei and humidity.**—*N.A.S.*

6H–64 551.574.1:551.524

Wait, G. R., **Relation between the diurnal variation of Aitken nuclei and the diurnal variation in the rate of change of air temperature.** *Carnegie Institution of Washington, Year Book*, No. 28:270, 1928/1929. 2 refs. **DLC**—Several works are discussed and three sets of diurnal variation of nuclei made in Washington, D. C., are considered. The data fail to show the close relationship. *Subject Headings:* **1. Nuclei diurnal variations 2. Nuclei and temperature 3. Washington, D. C.**—*N.A.S.*

6H–65 551.574.1:551.508.91

Wait, G. R., **The measurement of condensation nuclei with an Aitken counter.** *Carnegie Institution of Washington, Year Book*, No. 28:268–269, 1928/1929. refs. **DLC**—A discussion regarding the proper method for computing the number of nuclei/cm³ in the air from data obtained with an Aitken counter. *Subject Headings:* **1. Aitken nuclei counter 2. Nuclei count errors.**—*N.A.S.*

6H–66 551.574.1:551.508.91(26)

Wait, G. R., **The number of Aitken nuclei over the Atlantic and Pacific Oceans as determined aboard the "Carnegie" during the early part of Cruise VII.** *Carnegie Institution of Washington, Year Book*, No. 28:274–275, 1928/1929. table. **DLC**—Results of nuclei count, made by PARKINSON, are presented in table in which each value is the mean of ten determinations. The uncertainty of the exact functioning of the Aitken counter is mentioned and the values may need to be altered by a constant multiplier, which lies between 1 and 1.6. *Subject Headings:* **1. Nuclei over oceans 2. Nuclei instruments 3. "Carnegie" Expedition, VII, 1928–1929 4. Atlantic Ocean 5. Pacific Ocean.**—*N.A.S.*

6H–67 551.574.1:551.588.7

Wigand, Albert and Schmauss, August, **Die Atmosphäre als Kolloid.** [The atmosphere as a colloid.] Braunschweig, **1929.** 74 p. 10 figs., bibliog. p. 66–69. **DWB**—Comprehensive study of atmospheric aerosol-ions, dust and hydrometeors. Condensation nuclei characteristics are given on p. 33–40. They include the nuclei count under cyclonic weather conditions, under anticyclonic conditions, in big cities and industrial centers, in clean country air and in mountains. Vertical distribution of nuclei amount in high pressure areas is given for heights from 100 to 8500 m. (*Same item as* C–11 in March 1950 *MAB.*) *Subject Headings:* **1. Nuclei vertical distribution 2. Nuclei in city air 3. Nuclei in country air 4. Nuclei in mountain air 5. Nuclei and anticyclone 6. Nuclei and cyclone.**—*N.A.S.*

1930

6H–68 551.574.1:551.594.12

Daude, Denise, **Contribution a l'étude des particules en suspension dans l'atmosphère.** [Contribution to the study of particles suspended in the atmosphere.] *Paris. Université. Institut de Physique du Globe, Annales*, 8:111–120, **1930.** figs., tables, foot-refs. **DLC**—The number, nature, physical properties and physiological effect of suspended particles was studied. OWENS' apparatus is described. Dimensions of particles, variations of their number with meteorological conditions and diurnal and annual variations are discussed. *Subject Headings:* **1. Nuclei diurnal variations 2. Nuclei annual variations 3. Nuclei and meteorological elements 4. Large ions.**—*N.A.S.*

6H–69 551.574.1:551.594.12:551.588.7

*Israel, H., **Untersuchungen über schwere Ionen in der Atmosphäre.** [Investigation of heavy ions in the atmosphere.] *Beiträge zur Geophysik*, Leipzig, 26(3):283–313, **1930.** 17 figs., 14 tables, foot-refs. **DLC**—Number of large and small ions, positive and negative, as well as the number of nuclei were counted in Frankfurt a/M. twice daily during one year. Relationships to meteorological elements were analyzed statistically. Large and small ions always showed an opposite variation.

Urban influence on nuclei count is discussed. *Subject Headings:* **1. Ion annual variations 2. Larg ions 3. Nuclei and wind 4. Nuclei in city air 5. Frankfurt a/M., Germany.**—*N.A.S.*

6H–70 551.574.1:551.59

Kähler, K., **Über die Verteilung der Elektrizitätsträger in der Atmosphäre.** [Distributio of charged particles in the atmosphere.] *Meteorologische Zeitschrift*, 47(2):57–68, **1930.** fig 2 tables, ref., eqs. **DLC**—Series of observations on the number of the charged particles, thei mobility and the potential gradient is presented in a table and discussed along the lines of possibl sources of error in measurement and the normal distribution of heavy and light charge carrier *Subject Headings:* **1. Charged nuclei 2. Nuclei mobility 3. Large ions 4. Potential gradien** —*N.A.S.*

6H–71 551.574.1:551.594.12(41

Nolan, J. J. and Nolan, P. J., **Preliminary account of observations on atmospheric electricit in country air.** *Beiträge zur Geophysik*, Stuttgart, Leipzig, 25:414, **1930.** 3 figs., 2 tables, foot-ref **DLC**—The results of observations of atmospheric ionization and nucleation made at Glencre 18 km south of Dublin, during the period from Oct. 1928–Oct. 1929 are presented. The concentra tion of condensation nuclei in the atmosphere varied from an average value of 10,700 with nort winds to an average of 540 with west winds. The average value of the ratio of total nuclei to un charged nuclei was 1.90. The average concentrations of small ions were $n_+=388$ and $n_-=283$ The average value of the ratio n_+/n_- was 1.45. With some exceptions the relation between ions an nuclei fitted the equation $q=an^2+\zeta n\sqrt{Z}$ fairly well, the average value of q being 5 ions per cm³ pe second. *Subject Headings:* **1. Nuclei-ion combination 2. Small ions 3. Nuclei and wind 4. Dub lin, Ireland.**—*Authors' abstract.*

6H–72 551.576:629.135.

Peppler, W., **Wolkenbildung durch Flugzeuge.** [Cloud formation by aircraft.] *Zeitschri für angewandte Meteorologie*, Berlin, 47:35–46, **1930.** photo, 3 tables, 18 refs. **DWB**—Peppler summarizes the important writings on condensation trails. He refers briefly to the various explana tory theories such as that of A. Schmauss (exhaust provides condensation nuclei), D. Loewe (fros supersaturation of the upper air) and I. A. Riley (admixture of warmer air). He mentions als the theory that air at a high altitude can be free from the usual condensation nuclei and can oc casionally reach a relatively higher degree of supersaturation. In certain cases large ions can serv as nuclei for cloud formation. Peppler concludes that further study and observation of the phe nomena combined with a study of the colloidal character of the atmosphere is necessary to determin the cause of cloud formation by aircraft. (*Same item as* 21–25, Sept. 1951, *M.A.B.*) *Subject Heading* **1. Nuclei sources 2. Nuclei theory 3. Large ions. 4. Condensation trails.**

6H–73 551.574.1(26

Wigand, A., **Zählungen der Kondensationskerne auf dem Nordatlantik.** [Condensation nucle counts over the North Atlantic.] *Annalen der Hydrographie und Maritimen Meteorologie*, Hamburg 58(6):213–216, **1930.** 3 tables, refs. **DLC**—During his journey from Hamburg to New Yor and back the author made systematic observations on the count of nuclei with regard to differen air masses. Tables give the meteorological characteristics and nuclei count for the periods fro Oct. 11–20 and Nov. 1–9, 1929 by days and observation hours. *Subject Headings:* **1. Nuclei an temperature 2. Nuclei and wind 3. Nuclei and air mass 4. North Atlantic Ocean.**—*N.A.S.*

1931

6H–74 551.574.1:551.594.12:551.508.91(94

Hogg, A. R., **Aitken condensation nuclei.** *Nature*, London, 128(3239):908, **1931.** table 11 refs., eq. **DLC**—Aitken condensation nuclei were investigated at the Commonwealth Sola Observatory on Mount Strombo, ten miles from Canberra, Australia. Forty-nine tests were mad with an atmospheric electric chamber placed near an open window, and the nuclei were classified int groups according to their mobilities. The results are statistically represented by the equation $2N_0=1.12NA+1.37NB$, where N_0 is the number of uncharged ions; NA, the intermediate ions NB, the large ions. This equation does not indicate a constant ratio of charged to uncharged nucle and refutes the claims, made by Noland, Schweidler, Hess, Israel, Wait and others (on theo retical grounds) that under equilibrium conditions, the ratio of charged to uncharged nuclei i substantially a constant. The charge per intermediate ion, with mobility about 0.005 cm/se per volt/cm has been found to be unity in outdoor air. *Subject Headings:* **1. Charged nuclei 2. Un charged nuclei 3. Nuclei-ion combination 4. Nuclei count methods 5. Mount Strombo, Australia** —*N.A.S.*

6H–75 551.574.1:551.594.12:551.508.91

Köhler, Hilding, **Über die Kondensation an verschieden grossen Kondensationskernen und über die Bestimmung ihrer Anzahl.** [On the condensation on various large condensation nuclei and on the determining of their numbers.] *Beiträge zur Geophysik*, 29:168–186, **1931.** 3 figs., table, 18 refs., eqs. **DLC**—Because of new investigations of atmospheric ionization and the equilibrium of ionization in the atmosphere, the question has arisen whether the number of nuclei obtained with an Aitken dust counter is correct. Thermodynamical considerations as well as experiments of recent years prove that this number is questionable. Some meteorological phenomena are given as a proof of the investigation. *Subject Headings:* **1. Aitken counter defects 2. Large nuclei 3. Ion balance 4. Nuclei in fog.**—*From author's abstract.*

6H–76 551.574.1:551.576.11

Kuhlbrodt, E., **Bildung von Cirrus-Wölkchen beim Platzen von Pilotballonen in grossen Höhen in den Tropen.** [Formation of small Ci-clouds during bursting of pilot balloons at great heights in the tropics.] *Beitrage zur Geophysik*, Leipzig, 34:9–20, **1931.** 2 figs., 2 tables, 10 refs. **DLC**—The phenomenon of cloud formation is explained according to ALFRED WEGENER. In the particularly cold temperatures of the upper air layers above the tropics conditions exist conducive to supersaturation. The lacking condensation nuclei are provided by the dust clouds (talc) accompanying the bursting of balloons. (*Same item as* 2I–27, Sept. 1951, *MAB.*) *Subject Headings:* **1. Artificial nuclei 2. Artificial cloud formation.**

6H–77 551.574.1:551.577.11

Melander, G., **Über die Entstehung der Regentropfen.** [On the formation of raindrops.] *Beiträge zur Geophysik*, Leipzig, 32:268–270, **1931.** ref. **DLC**—Observations and discussion of formation of water droplets in the air and the condensation nuclei on which they form. Water drops can also act as condensation nuclei. Speculation is made on the part of electric energy in precipitation formation. No data or conclusions. (*Same item as* C–14, March 1950, *MAB.*) *Subject Headings:* **1. Droplet nuclei 2. Drop formation.**

6H–78 551.574.1:551.578.41

Stüve, G., **Zur Kenntnis der Kristallisation des Wasserdampfes aus Luft.** [The mechanism of crystallization of water vapor from the air.] *Beiträge zur Geophysik*, Leipzig, 32:326–335, **1931.** 6 figs., 2 tables, refs. **DLC**—Effects of different hydroscopic nuclei for formation of precipitation are discussed by comparing snow and rime. Temperatures are determined in respect to condensation and crystallization formation. (*Same item as* C–15, March 1950, *MAB.*) *Subject Headings:* **1. Hygroscopic nuclei 2. Ice crystal formation.**

6H–79 551.574.1:551.594.12

Wait, G. R., **Diurnal variation of concentration of condensation nuclei and of certain atmospheric-electric elements at Washington, D. C.** *Terrestrial Magnetism and Atmospheric Electricity*, Wash., D. C., 36(2):111–131, June **1931.** 7 figs., 2 tables, refs., 7 eqs. **DLC**—Results of 24-hour series of measurements of condensation nuclei (N_A) obtained on the grounds of the Dept. of Terrestrial Magnetism of Carnegie Institution of Washington, D. C., late in March in 1927, 1928 and 1930 are presented and discussed. Diurnal variation curve for nuclei count is similar to the general temperature curve; high values occur during the daylight hours and low values during the night. Rate of ionization, calculated from the linear recombination law, shows a diurnal variation curve very similar to that for the negative air-earth current as computed from potential gradient and negative conductivity. *Subject Headings:* **1. Nuclei diurnal variations 2. Ion diurnal variations 3. Washington, D. C.**—*N.A.S.*

1932

6H–80 551.574.1:551.594.13

Israël, H. and Schulz, L., **Über die Grössenverteilung der atmosphärischen Ionen.** [Size variations of atmospheric ions.] *Meteorologische Zeitschrift*, 49:226–233, **1932.** 2 figs., 5 tables, 17 refs. **DLC**—After a brief historical review, the authors present the material on ion spectrum—classification of the variety of ions according to their mobility, illustrated by observations taken in several places in Germany. Relationships to meteorological elements are also discussed. *Subject Headings:* **1. Ion mobility 2. Literature reviews 3. Germany.**—*N.A.S.*

6H–81 551.574.1:551.508.91

Hess, Victor F. and O'Brolchain, C., **An error in the marking of an Aitken "Pocket dust-counter."** *Beiträge zur Geophysik*, Leipzig, 37(4):386–389, **1932.** 3 refs., eqs. **DLC**—An error in the dilution marks of an Aitken "pocket dust-counter" is discussed. The error in the higher dilutions (i.e., 1/20, 1/50, 1/100) is considerable. The correct method of marking is given. *Subject Heading:* **1. Aitken dust counter.**—*Authors' abstract.*

6H–82 551.574.1:551.508.9

Scholz, Joachim, **Vereinfachter Bau eines Kernzählers.** [A simplified nuclei counter.] *Meteorologische Zeitschrift*, 49(10):381–388, **1932.** fig., 6 tables, 2 refs., eqs. **DLC**—Elaborate description of improved model of Scholz's counter for charged and uncharged nuclei. *Subject Headings:* **1. Scholz nuclei counter.**—*N.A.S.*

6H–83 551.574.1:551.510.42(42

Wright, H. L., **Observations of smoke particles and condensation nuclei at Kew Observatory, Great Britain.** *Meteorological Office, Geophysical Memoirs*, 6(57):1–57, **1932.** 6 figs., 15 tables, foot-refs., 2 eqs. **DLC**—A study of suspended particles which are found in the lower strata of the atmosphere. Three groups are considered: 1) finely divided matter such as soot, smoke, dust, pollen grains, crystals, etc.; 2) nuclei of condensation and 3) small electronic particles. Diurnal and annual variations of nuclei concentration are investigated, as well as variations of nuclei count with wind, humidity and cloud amount. In conclusion, the author presents the correlation coefficients between smoke particles and condensation nuclei by seasons, and their standard errors. *Subject Headings:* **1. Nuclei diurnal variations 2. Nuclei annual variations 3. Nuclei and wind 4. Nuclei and humidity 5. Nuclei and smoke 6. Kew Observatory, England.**—*N.A.S.*

1933

6H–84 551.574.1:551.575.1

*Köhler, Hilding, **Über die Chlorverteilung und die Tropfengruppen im Nebel und über Farbenberechnung der Kränze im weissen Lichte nebst einigen kritischen Bemerkungen der Koagulationstheorien der Nebeltropfen.** [On chlorine distribution and drop-groups in fog and on the color calculation of the corona of white light along with some critical remarks on the coagulation theory of fog droplets.] *Arkiv för Matematik, Astronomi och Fysik*, Stockholm, 24A(9), **1933.** 50 p. 8 figs., 16 tables, 26 refs., eqs. **DWB**—Several groups of drop size have been determined in fog. The masses of drops in the 3rd group were interrelated as 2^n, and hence it was concluded that the same relationship existed for the nuclei masses. (*Same item as* C–17, March 1950, *MAB.*) *Subject Headings:* **1. Nuclei size 2. Nuclei masses 3. Fog droplets.**—*N.A.S.*

6H–85 551.574.1(261)

Maurain, C. and Devaux, J., **Étude des noyaux de condensation atmosphériques au cours d'un voyage au Groenland.** [Investigation of condensation nuclei during voyage to Greenland.] *Paris. Université. Institut de Physique du Globe, Annales*, 9:88–89, **1933.** refs. **DLC**—Nuclei count was made with Aitken-Ludeling apparatus. During the voyage the extreme count values were: 11,000 and 24,000 and the average: 17,600. In the roadstead and at ports the maximum reached 85,000. In Greenland the count averaged 15,600. *Subject Headings:* **1. Nuclei geographical distribution 2. Greenland 3. North Atlantic Ocean.**—*N.A.S.*

6H–86 551.574.1:551.594.12

Nolan, P. J., **The influence of condensation nuclei and dust particles on atmospheric ionization.** *Royal Irish Academy, Proceedings, Sec. A*, 41(7):61–69, May **1933.** 2 figs., refs., eqs. **DLC**—Discussion of previous experiments on the relationship between the rate of disappearance of small ions in a closed vessel and the concentrations of nuclei and dust. Assuming an equilibrium formula, the combination coefficients "a" and "b" of small ions with dust particles and with condensation nuclei are deduced from experiments in a closed vessel. The rate of disappearance of nuclei is found to be proportional to the concentration, when the concentration is low. *Subject Headings:* **1. Small ions 2. Nuclei-ion combination 3. Nuclei decay.**—*N.A.S.*

6H–87 551.574.1:551.594.12(436)

O'Brolchain, C., **Measurements made at Graz of the value $N_0/N_\perp$, i.e., the ratio of the number of uncharged nuclei to the number of charged nuclei of one sign.** *Beiträge zur Geophysik*, 38:4–15, **1933.** fig., 2 tables, 14 refs., eqs. **DLC**—Using a cylindrical condenser in conjunction with an Aitken nuclei counter, measurements were made on the outskirts of Graz, Austria, of Z, the total number of nuclei and N_0, the number of uncharged nuclei in the air. As $Z = N_0 + N_+ + N_-$ where N_+ and N_- denote the number of charged nuclei (i.e., large ions) of each sign, we can calculate the value of N_+ or N_- on assuming that $N_+ = N_-$ which is generally true. The most reliable values of Z/N_0 and N_0/N_+ are 1.88 and 2.67, respectively, in fair agreement with the results of other investigators. Some abnormally high values of N_0/N_+ were obtained. A peculiar decay of the nuclei was noticed. *Subject Headings:* **1. Charged nuclei 2. Uncharged nuclei 3. Nuclei-ion combination 4. Graz, Austria.**—*Author's abstract.*

6H–88 551.574.1:551.594.12

Schachl, F., **Untersuchungen über die Zahl der geladenen und ungeladenen Kondensationskerne in Stadt und Gebirgsluft.** [Investigation of the number of charged and uncharged nuclei in city

and mountain air.] *Beiträge zur Geophysik*, 38:202–219, 1933. 2 figs., 9 tables, refs., eqs. **DLC**—Measurements of numbers of Aitken nuclei and charged nuclei of slow and intermediate mobility were made during Oct. 1931–Sept. 1932 in Innsbruck and vicinity. The results show a drastic decrease of number of both types of nuclei after rainfall and with a strong wind. Meteorological influences on the large ions are evident but not on the intermediate ones. In mountain air the number of nuclei decreases rapidly with height. *Subject Headings:* **1. Charged nuclei 2. Large ions 3. Nuclei mobility 4. Nuclei and wind 5. Innsbruck, Austria.**—*N.A.S.*

6H–89 551.574.1:551.594.12

Whipple, F. J. W., **Relations between the combination coefficients of atmospheric ions.** *Physical Society of London, Proceedings, Pt. 3*, 45(248):367–380, May 1, 1933. 2 figs., 2 tables, foot-refs., 8 eqs. **DLC**—A highly theoretical treatment of relationships existing between ions and charged or uncharged condensation nuclei. The author suggested a formula which indicates that the combination coefficient for small ions and large ions of the opposite sign exceeds the coefficient for small ions and uncharged nuclei, and further that the difference between the two coefficients depends on the mobility of the small ions. Applications of this formula are discussed. *Subject Heading:* **1. Nuclei-ion combination.**—*N.A.S.*

1934

6H–90 551.574.1:551.594.12

Harper, W. R., **On the theory of the combination coefficients for large ions and for uncharged particles at any pressure.** *Philosophical Magazine*, London, Ser. 7, 18(117):97–113, July 1934. 4 figs., refs., 7 eqs. **DLC**—Recombination coefficients for large ions are calculated by different formulas obtained for different values of the radius of the ion and different pressures. *Subject Headings:* **1. Nuclei-ion combination 2. Large ions.**—*N.A.S.*

6H–91 551.574.1:551.586.1

Landsberg, Helmut E., **Observations of condensation-nuclei in the atmosphere.** *Monthly Weather Review*, Wash., D. C., 62(12):442–445, Dec. 1934. 7 figs., 25 refs. **DLC**—1. The results of 1.051 observations of condensation nuclei at four different locations are given. 2. Connections between the number of nuclei and convection and turbulence are shown and correlations between nuclei counts, relative humidity, visibility and wind are mentioned. 3. The relationship between nuclei contents and air mass is discussed, and the former found to be a valuable help in air mass analysis. 4. The effects of nuclei on human health, and their adsorption of radioactive emanation, principally with the occurrence of surfaces of substance, are discussed. *Subject Headings:* **1. Nuclei geographical distribution 2. Nuclei and air masses 3. Nuclei effect on human health 4. Nuclei and wind 5. Nuclei and visibility.**—*Author's abstract.*

6H–92 551.574.1(261)(431.5)

Landsberg, Helmut E., **Zählungen von Kondensationskernen auf dem Taunusobservatorium.** [Nuclei count at the Taunus Observatory.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, 1:125–128, 1934. 2 figs., 4 tables, foot-refs. **DWB**—During the cold season of 1933–34 nuclei count was carried out on top of an elevation for a total of 120 days with 5 or 8 observations daily. Results are discussed and the relationship to humidity, visibility and wind is analyzed and illustrated with a very instructive diagram of interdiurnal variations under different meteorological conditions and a nuclei wind-rose. Appended is information on nuclei counts made over the Atlantic Ocean during a voyage to the United States in May 1934. *Subject Headings:* **1. Nuclei diurnal variations 2. Nuclei and wind 3. Taunus Observatory, Germany 4. Atlantic Ocean.**—*N.A.S.*

6H–93 551.574.1:551.594.11:551.508.91

Nielsen, Russell A., **A study of atmospheric dust using a continuous recording jet-counter.** *Terrestrial Magnetism and Atmospheric Electricity*, Wash., D. C., 39(4):281–292, Dec. 1934. 6 figs., 11 refs. **DLC**—A new device for continuously recording the dust-content of the air was used to obtain records of atmospheric dust at Stanford University, Calif. Continuous dust records from Jan. 13 to March 17, 1934, were made and the variations in the dust content of the air correlated with other atmospheric phenomena recorded at this station. In particular, the space-charge tended to vary inversely as the dust-content, while the potential gradient seemed to be unaffected by changes in the amount of dust. (*Same item as* A–59, Jan. 1950, *MAB.*) *Subject Headings:* **1. Dust nuclei 2. Nuclei and atmospheric electricity 3. Owen jet recorder.**—*Author's abstract.*

6H–94 551.574.1:551.508.91:551.594.12

*Torreson, O. W. and Wait, G. R., **Measurements of total nuclei, of uncharged nuclei, and of large ions in the free atmosphere at Washington, D. C.** *Terrestrial Magnetism and Atmospheric Electricity*, Wash., D. C., 39(1):47–64, 1934. 2 figs., 5 tables, 10 refs. **DLC**—Counting of total and uncharged condensation nuclei was made on grounds of Department of Terrestrial Magnetism of Carnegie Institution in Washington, D. C. Apparatus and techniques are described and results of

observations given in tables. The nuclei content was greater in summer and the ratio N_0/N_A increased with increasing nuclei count. The number of large ions, when added to the number of uncharged nuclei, accounts for all the nuclei in the atmosphere: $N_0+2N_\pm=N_A$. The ratio of the number of uncharged nuclei to the number of large ions of one sign, $N_0/N_\pm$ is 5.8. *Subject Headings:* **1. Nuclei instruments 2. Large ions 3. Nuclei annual variations 4. Charged nuclei 5. Washington, D. C.**—*N.A.S.*

6H-95 551.574.1:551.594.12

Torreson, O. W., **On the value of the ratio of the number of uncharged nuclei (N_0) to the number of charged nuclei of one sign ($N_\pm$) at Washington, D. C.** *Terrestrial Magnetism and Atmospheric Electricity*, Wash., D. C., 39(1):65–68, **1934.** fig., table, 8 refs., 2 eqs. **DLC**—Diurnal variation in charged nuclei of one sign $N_\pm$ and in total nuclei N_A are deduced from previously published data and a curve of the diurnal variation in the ratio $N_\pm/N_A$ is obtained showing that this ratio is not constant through the day but changes considerably, having the maximum value about 5 or 6h, 75th meridian time. This defies the present conception of the mechanism of ionic equilibrium in the free atmosphere which assumes that $N_0/N_\pm$ is a constant. *Subject Headings:* **1. Nuclei diurnal variation 2. Charged nuclei 3. Nuclei-ion combination 4. Washington, D. C.**—*N.A.S.*

6H-96 551.574.1:551.571.31

Wright, H. L., **The association between relative humidity and the ratio of the number of large ions to the total number of nuclei.** *Terrestrial Magnetism and Atmospheric Electricity*, Wash., D. C., 39(4):277–280, **1934.** fig., 2 refs., 9 eqs. **DLC**—Theoretical reasons are advanced which support the observation noted by O. W. TORRESON, that the diurnal variation of the ratio N_1/N closely resembles the diurnal variation of relative humidity. A formula is obtained which relates the ratio N_1/N to the radius of nuclei. *Subject Headings:* **1. Large ions 2. Ions and humidity.**—*Author's abstract.*

1935

6H-97 551.574.1:551.594.14

Aliverti, Giuseppina and Rosa, G., **Zur Frage der Adsorption von RaEm an Kernen.** [On the adsorption of radium emanation on nuclei.] *Beiträge zur Geophysik*, 44(2):107–111, **1935.** fig., 2 tables. Italian and German summaries p. 107. **DLC**—ALIVERTI's method of measurement of atmospheric radioactivity is discussed. Considering the presence of active Thorium-precipitation in the atmosphere and the results of experiments, it is concluded that the adsorption of radium emanation on nuclei is very improbable. *Subject Headings:* **1. Nuclei theorie 2. Radioactivity of the atmosphere 3. Nuclei and radioactivity.**—*N.A.S.*

6H-98 551.574.1:551.553.21

Bossolasco, Mario, **Über die Anzahl der Kondensationskerne in Mogadischu.** [The number of condensation nuclei in Mogadiscio.] *Beiträge zur Geophysik*, Stuttgart, 44:1–15, **1935.** fig., 13 refs. English summary p. 1. **DLC**—Technique of nuclei counting made at Mogadiscio during the International Polar Year is described and results show that nuclei were very rare because of the marine winds which nearly always predominate in Mogadiscio. NE-monsoon before reaching the continent has an average number of nuclei of about 400 N/cm³ but after its passage over land a great and rapid increase in nuclei content was observed. *Subject Headings:* **1. Nuclei instruments 2. Nuclei in marine air 3. International Polar Year, 1932–1933 4. Mogadiscio, East Africa.**—*N.A.S.*

6H-99 551.574.1

Coste, J. H. and Wright, H. L., **The nature of the nucleus in hygroscopic droplets.** *Philosophical Magazine*, London, 20(132):209–234, **1935.** 6 tables, 19 refs. **DLC**—Laboratory experiments were conducted to determine the concentration of nuclei in an enclosed chamber introducing various substances which might be possible sources of nuclei. Tables show the concentrations of nuclei: 1) before and after combustion of various fuels; 2) before and after combustion of a flame of commercial coal gas; 3) before and after electrical heating of metal surfaces and 4) before and after introducing $H_2S_2O_7$ or a concentrated solution of HCl. *Subject Headings:* **1. Artificial nuclei 2. Nuclei experiments.**—*N.A.S.*

6H-100 551.574.1

Junge, Christian, **Neue Untersuchungen an den grossen atmosphärischen Kondensationskernen.** [New investigations of large atmospheric condensation nuclei.] *Meteorologische Zeitschrift*, 52(12):467–470, **1935.** 5 figs., ref. **DLC**—Properties of large nuclei with radius 10^{-7} to 10^{-5} cm are analyzed to establish the relationship between their radii and the supersaturation rate. Figures show the growth of sulfuric nuclei with increasing relative humidity and curves of supersaturation as a function of radius. *Subject Headings:* **1. Large nuclei 2. Sulfuric nuclei 3. Nuclei growth 4. Supersaturation.**—*N.A.S.*

6H–101 551.574.1:551.571:551.508.94

Junge, Christian, **Übersättigungsmessungen an atmosphärischen Kondesationskernen.** [Measurements of supersaturation on condensation nuclei.] *Beiträge zur Geophysik*, Leipzig, 46(1/2): 108–129, **1935.** 12 figs., 2 tables, 10 refs. **DLC**—Supersaturation to 20% was studied by the author by a new method of step-wise expansion and photographic determination of the amount of water droplets formed each time. Artificially produced nuclei were used. Their size was measured with Israël's ion counter. KÖHLER's theory on the nature of nuclei as saline drops is proved by relationship between radius and supersaturation rate obtained experimentally. (*See also* C-21, March 1950, *MAB.*) *Subject Headings:* **1. Nuclei experiments 2. Artificial nuclei 3. Nuclei size 4. Israël ion counter 5. Köhler theory.**—*N.A.S.*

6H–102 551.574.1:551.586.1

Landsberg, Helmut E., **Observations of condensation nuclei in the atmosphere.** *American Meteorological Society, Bulletin*, 16:64–65, **1935. DLC**—Observation of condensation nuclei in the atmosphere were made at a crest and at a slope station in Germany and compared with observations made at State College, Pennsylvania and on the North Atlantic Ocean. Vertical distribution of nuclei depends on the direction and speed of air currents. Relationships to air masses, meteorological elements, turbidity and many other factors are clearly stated in this brief but valuable paper. *Subject Headings:* **1. Nuclei geographical distribution 2. Nuclei and air masses 3. Nuclei and man.**—*N.A.S.*

6H–103 551.574.1(417)

Nolan, J. J. and Guerrini, V. H., **The diffusion coefficients and velocities of fall in air of atmospheric condensation.** *Royal Irish Academy, Dublin, Proceedings, Sec. A*, 43(2):5–24, **1935.** 7 tables, foot-refs., eqs. **DLC**—Complete theory and description of experiments are given. In Dublin, air diffusion coefficient was 18×10^{-6} cm²/sec, velocity of nuclei fall was 7.5×10^{-5} cm/sec. The relationship found between the concentration of small ions and nuclei in the atmosphere can be explained by taking into account the fact that in nucleated air the size of the nuclei increases as their concentration diminishes. *Subject Headings:* **1. Nuclei diffusion 2. Nuclei fall velocity 3. Nuclei size 4. Dublin, Ireland.**—*N.A.S.*

6H–104 551.574.1:551.508.94:551.594.13

Nolan, J. J. and Nolan, P. J., **A new method for counting atmospheric ions and determining their mobilities.** *Royal Irish Academy, Dublin, Proceedings, Sec. A*, 42:15–20, **1934/35.** 2 figs., foot-refs., 2 eqs. **DLC**—Complete theory and drawing of the apparatus are given and a sample graph shows the mobilities of small ions charged positively and negatively. *Subject Headings:* **1. Ion mobility 2. Ion counters.**—*N.A.S.*

6H–105 551.574.1:551.506.5(984)

*Scholz, Joachim, **Kernzahlmessungen auf Franz-Josephs-Land.** [Condensation nuclei count on Franz Josef Land.] *Beiträge zur Geophysik*, 43(4):419–423, **1935.** table, 2 refs. **DLC**—During the International Polar Year 1932/33, the author participated in the Russian Expedition to Franz Josef Land and carried along a large nuclei counter. Observational data, some of which were taken during snow storms, are presented in a table. *Subject Headings:* **1. Nuclei and wind 2. Arctic expeditions 3. Franz Josef Land, Russian Arctic.**—*N.A.S.*

6H–106 551.574.1

Scrase, F. J., **The charged and uncharged nuclei in the atmosphere and their part in atmospheric ionisation.** *Great Britain. Meteorological Office, Geophysical Memoirs*, 7(64), **1935.** 15 p. 7 figs., 5 tables, 24 refs., 10 eqs. **DLC**—Simultaneous observations of electrical conductivity and the concentration of charged and uncharged nuclei enabled the author to obtain an estimate of the rate of production of ions in the open air. Relation between the numbers of large ions and uncharged nuclei is shown on a graph. *Subject Headings:* **1. Charged nuclei 2. Uncharged nuclei.**—*N.A.S.*

6H–107 551.574.1:551.591(42)

Wright, H. L., **Visibility and atmospheric suspendoids at Kew Observatory.** *Royal Meteorological Society, Quarterly Journal*, 61(258):71–77, Jan. **1935.** 4 tables, 2 refs. Discussion p. 71–80. **DLC**—Special investigations on the visibility and the concentration of particles and nuclei carried out at the Observatory during 1928–1930. The actual objects used for these observations were located at a distance up to 20,000 m. The number of particles was determined by means of the Owens jet dust counter and the number of nuclei by the Aitken nuclei counter. The measurements of absolute and relative humidity were included in these investigations. It was found that visibility range above 2 km is practically independent of nuclei and humidity. The range of visibility varies inversely as the number of particles rise to a quantity apparently a little greater than unity. Mist

and fog are associated with high humidity and with high concentration of particles and nuclei. (*Same item as* 31-93, Sept. 1952, *MAB.*) *Subject Headings:* **1. Nuclei and fog 2. Nuclei and visibility 3. Kew Observatory, England.**—*N. T. Zikeev.*

1936

6H–108 551.574.1:551.594.1(45)

*Aliverti, Giuseppina, **Elettricità, radioattività, nuclei di condensazione nell'atmosfera di Cortina d'Ampezzo.** [Electricity, radioactivity and condensation nuclei in the atmosphere at Cortina d'Ampezzo.] *Italy. Consiglio Nazionale delle Ricerche. Comitato per la Geodesia e la Geofisica. Bollettino, Ser. 2,* 6(1/2):1–14, Jan./April, **1936.** 5 figs., 6 tables, 6 refs. **DLC**—Observations of electrical conductivity of the atmosphere, field intensity, vertical current, and on the content of radium and nuclei were made by Cardivilla Heliotherapeutic Institute from April 1935 to Jan. 1936. Results of measurements of potential gradient and of the intensity of vertical conductivity are given in Tables 1 and 2 as mean values for various hours from 6 a.m. to 10 p.m. local time. Table 5 shows that the conductivity of positive ions is greater than that of negative ones. Table 6 gives mean daily values of radium counts in atoms/cm³ for April, June, Aug. and Jan. Diurnal variations of radium content in Aug., presented in Graph 4, show the minimum during 12–16h. No relationships between radium content and the meteorological elements could be detected and only some parallels in variations with relative humidity were noticed. Nuclei were counted during June, Aug. and Jan. several times a day, using a small model Aitken counter, which made 5 consecutive observations each time. Especially low counts were noticed in the morning at 10 a.m. when individual counts gave only 700 nuclei/cm³. *Subject Headings:* **1. Nuclei diurnal variations 2. Radioactivity of the atmosphere 3. Cortina d'Ampezzo, Italy.**—*N.A.S.*

6H–109 551.574.1:551.578.4

Holzman, B., **A note on Bergeron's ice-nuclei hypothesis for the formation of rain.** *American Meteorological Society, Bulletin,* 17:331–333, Nov. **1936.** 7 refs. **DWB**—Discussion of BERGERON's theory that ice particles are the nuclei upon which condensation will occur in the formation of rain. It is concluded here that ice nuclei are not essential for the production of (even heavy) rain. (*Same item as* C–20, March 1950, *MAB.*) *Subject Headings:* **1. Ice nuclei 2. Bergeron theory.**

6H–110 551.574.1:551.508.9

Junge, C., **Zur Frage der Kernwirksamkeit des Staubes.** [The problem of effectiveness of dust as nuclei.] *Meteorologische Zeitschrift,* 53(5):186–188, **1936.** 2 figs., 4 tables, 3 refs. **DLC**—Specifically arranged investigations of various types of dust were carried out using the Scholz nuclei counter. It was found that the tiny paraffin and oil drops are also effective as condensation nuclei and from this it is deduced that the Scholz nuclei counter shows all the particles, irrespective of their chemical nature. *Subject Headings:* **1. Dust nuclei 2. Scholz nuclei counter 3. Artificial nuclei.**—*Trans. from author's abstract.*

6H–111 551.574.1:551.508.9

Nolan, J. J. and Guerrini, V. H., **The determination of the mass and size of atmospheric condensation nuclei.** *Faraday Society, London, Transactions,* 32:1175–1181, Aug. **1936.** 2 figs., refs., eqs. **DLC**—Experimental methods described. Calculations of velocity of fall, of coefficient of diffusion, of mass and size given. Effect of time. Observations on nuclei in country air. (*Same item as* A-95, Jan. 1950, *MAB.*) *Subject Headings:* **1. Nuclei size 2. Nuclei fall velocity 3. Nuclei diffusion coefficient 4. Nuclei in country air.**

6H–112 551.574.1(435.1)

Voigts, Heinrich, **Ergebnisse von Kernzählungen in Lübeck-Travemünde.** [Results of nuclei counts in Lubeck-Travemunde.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter,* 3:170–174, **1936.** 4 figs., 5 tables. **DWB**—Nuclei count was made from July 1935 to Oct. 1936. Diurnal variations for single months are presented and dependence on wind direction and air masses is shown. *Subject Headings:* **1. Nuclei diurnal variations 2. Nuclei and wind 3. Nuclei and air masses 4. Lubeck-Travemünde, Germany.**—*N.A.S.*

6H–113 551.574.

Wright, H. L., **The size of atmospheric nuclei; some deductions from measurements of the number of charged and uncharged nuclei at Kew Observatory.** *Physical Society of London, Proceedings,* 48:675–689, **1936. DLC**—The object of the paper is to set out formulas to be used in determining the size of condensation nuclei. (Corrected by G. C. SIMPSON, 1941.) (*Same item as* C–23, March 1950, *MAB.*) *Subject Heading:* **1. Nuclei size.**

1937

6H–114 551.574.1:551.508.91

Aliverti, Giuseppina, **Su l'apparecchio di Aitken e misure di nuclei di condensazione.** [Aitken's apparatus and the measurement of condensation nuclei.] *Italy. Consiglio Nazionale delle Ricerche. Comitato per la Geodesia e la Geofisica, Bollettino, Ser. 2,* 7(1/2), Jan./April, **1937.** 11 p. fig., table, 6 refs., eqs. German summary p. 11. **DLC**—The author describes the defects of the Aitken apparatus which appear when used continuously. She explains also how this defect could be avoided. About 100 measurements were made in various places, at the seaside, in a field, in a city and in mountains, and the results are interpreted in relation to meteorological elements. *Subject Headings:* **1. Nuclei instruments 2. Nuclei geographical distribution 3. Nuclei and wind.**—*N.A.S.*

6H–115 551.574.1(433)

*Burckhardt, H., **Messungen der Kernzahl auf der Kalmit.** [Nuclei measurements on the Kalmit.] *Beiträge zur Physik der freien Atmosphäre,* Strasbourg, 24(3):190–198, **1937.** 7 tables, 2 refs. **DLC**—Daily measurements of nuclei content were made between 10 and 11 a.m. from Dec. 12, 1936 to March 25, 1937 at the Kalmit Observatory. Various problems of measurement technique are discussed and the results of observations are presented in tables. Relationships with meteorological factors are analyzed. The variations in nuclei count are most remarkable during the passing of fronts, during fog, and by inversions. *Subject Headings:* **1. Nuclei and inversions 2. Nuclei and fog 3. Nuclei and air masses 4. Kalmit Observatory, Germany.**—*N.A.S.*

6H–116 551.574.1:551.506.7

Dirffel, K.; Lettau, H. and Rotschke, M., **Luftkörperalterung als Austauschproblem auf Grund von Staub-und Kerngehaltsmessungen.** [Ageing of air masses as an austausch problem on the basis of dust and nuclei measurements.] *Meteorologische Zeitschrift,* Berlin, 54(1):16–23, **1937.** 9 figs., 3 tables, 10 refs., eqs. **DWB**—Observations of nuclei numbers made during two free balloon flights provided data from the free atmosphere for presentation of the vertical stream of dust particles and nuclei and characteristics of the ageing of air masses. The vertical austausch coefficient for a fresh Polar air mass is 400 g/cm/sec. The speed of nuclei collision has to be taken into account by the theory of vertical distribution of particles. *Subject Headings:* **1. Nuclei vertical distribution 2. Air mass ageing 3. Nuclei fall velocity.**—*N.A.S.*

6H–117 551.574.1

Findeisen, W., **Entstehen die Kondensationskerne an der Meeresoberfläche?** [Do condensation nuclei originate at the sea surface?] *Meteorologische Zeitschrift,* Berlin, 54(10):377–379, Oct. **1937.** 13 refs. **DWB**—Most condensation nuclei do not originate as salt particles from sea surf, but from the continent. (*Same item as* C–24, March 1950, *MAB.*) *Subject Heading:* **1. Nuclei sources.**—*From author's abstract.*

6H–118 551.574.1(436)

Giner, Romed and Hess, Victor Francis, **Studie über die Verteilung der Aerosole in der Luft von Innsbruck und Umgebung.** [Studies on the distribution of aerosols in the air of Innsbruck and neighborhood.] *Beiträge zur Geophysik,* Stuttgart, 50:22–43, **1937.** 4 figs., 13 tables. English summary p. 22; German summary p. 42–43. **DLC**—Diurnal and annual variations of dust content and nuclei in Innsbruck and surroundings are tabulated and plotted, and vertical decrease discussed. (*Same item as* 3G–167, July 1952, *MAB.*) *Subject Headings:* **1. Dust nuclei 2. Nuclei vertical distribution 3. Innsbruck, Austria.**—*C.E.P.B.*

6H–119 551.574.1

Jacobs, W. C., **Preliminary report on a study of atmospheric chlorides.** *Monthly Weather Review,* Wash., D. C., 65:147–151, **1937.** 4 figs., 2 tables, 22 refs. **DLC**—Brief review of the knowledge of condensation nuclei and atmospheric nucleation is followed by description of apparatus, procedure and results of atmospheric chloride investigations made under various meteorological conditions. It is pointed out that: "The knowledge of the probable sizes of the particles and their effectiveness as condensation nuclei togetner with a determination of the salt content of the air would make deductions possible regarding the importance of the sea as a source of atmospheric nuclei." *Subject Headings:* **1. Nuclei source 2. Chloride nuclei.**—*N.A.S.*

6H–120 551.574.1:551.508.91:551.594.12

Kahler, K. and Zegula, Kw., **Messungen des Kern- und Ionengehaltes der Luft auf Norderney.** [Measurements of nuclei and ion content in the air of Norderney.] *Annalen der Hydrographie und Maritimen Meteorologie,* Hamburg, 65(3):111–118, **1937.** 2 figs., tables, 14 refs., eqs. **DLC**—Charged and uncharged nuclei and small ions were counted in Aug. and Sept. 1936 in the NW corner of Norderney Island. Methods and installations are described. Results of observations are

discussed explaining the influence of humidity, the effects of various air masses and of other meteorological factors. Relationships of uncharged nuclei to the total count and to charged nuclei count are analyzed. *Subject Headings:* **1. Nuclei instruments 2. Nuclei-ion combination 7. Small ions 4. Nuclei and air masses 5. Nuclei and humidity 6. Norderney Island, North Sea.**—*N.A.S.*

6H–121 551.574.1:551.588

Landsberg, H., **The environmental variation of condensation nuclei.** *American Meteorological Society, Bulletin,* 18(4/5):172, April/May **1937.** table, ref. **DLC**—A concise but very instructive contribution to the comparative study of geographical distribution of nuclei. Characteristic figures of nuclei concentration are given in a table for various localities—city, countryside, mountain, open ocean, etc. *Subject Heading:* **1. Nuclei geographic distribution.**—*N.A.S.*

6H–122 551.574.1:551.575.1:551.510.41

Rudakova, N. V., **Ozon kak faktor kondensatsii vodianykh parov.** [Ozone as a condensation factor for water vapor.] *Leningrad. Institut Eksperimental'noi Meteorologii, Trudy,* No. 1:102–108, **1937.** 5 figs., 3 tables, 9 refs. **DLC**—Investigation of properties of fog which is formed in humid air by chemical reaction of ozone with ammonia and clarification of chemical affinity of this reaction. Methods and apparatus are described. It is stated that ozone, which is formed in the atmosphere by the action of ultraviolet sun radiation, can cause a natural formation of condensation nuclei. The ammonia which is present in the air in a quantity reaching 2 mg/100 m^3, and also some admixture of sulfur gas and hydrogen sulfide, can be oxidized by ozone and results in formation of condensation nuclei in the atmosphere. In higher levels of the atmosphere where the concentration of ozone can be greater, but to which the admixtures of ammonia, hydrogen sulfide and sulfur gas cannot reach, the condensation nuclei can be formed by reaction of ozone with nitrogen producing some oxide nitrogen. In these experiments the molecules of nitrogen oxides served as condensation nuclei. *Subject Headings:* **1. Nitrous oxide nuclei 2. Artificial nuclei 3. Ozone effect 4. Fog formation.**—*N.A.S.*

1938

6H–123 551.574.1:551.578:551.508.91

Gabran, O., **Verfahren zur Abscheidung von Aerosolen aus Schnee und Hagel.** [Process for separation of aerosols from snow and hail.] *Meteorologische Zeitschrift,* Berlin, 55(3):112–113, March **1938.** 2 refs. **DWB**—A technique for catching fresh snow or hail in a two liter jar containing pure petroleum at subfreezing temperature, allowing the impurities to be separated and examined microscopically or spectroscopically in order to determine the nature of the condensation nuclei. (*Same item as* D 40, April 1950, *MAB.*) *Subject Headings:* **1. Hail formation 2. Spectroscopic method 3. Microscopic method.**—*M.R.*

6H–124 551.574.1(494)

Glawion, Horst, **Staub und Staubfälle in Arosa.** [Dust and dust falls in Arosa.] *Beiträge zur Physik der Freien Atmosphäre,* Strasbourg, 25(1):1–43, **1938.** 16 figs., 15 tables, 38 refs. **DLC**—A thorough and detailed study of the content and nature of dust nuclei in the atmosphere of this Swiss resort. Installations, instruments and observation techniques are described and the results are analyzed in relation to meteorological factors and weather situations. The counts gave very low values for dust and for nuclei content, and it was noticed that they showed opposite annual variations; low nuclei content in summer and high concentration in winter against high dust content in summer and low in winter. *Subject Headings:* **1. Nuclei annual variations 2. Nuclei and air masses 3. Nuclei instruments 4. Arosa, Switzerland.**—*N.A.S.*

6H–125 551.574.1

†*Landsberg, Helmut E., **Atmospheric condensation nuclei.** *Ergebnisse der Kosmischen Physik,* Leipzig, 3:155–252, **1938.** 16 figs., 26 tables, 227 refs., 59 eqs. **DLC**—A highly technical and comprehensive treatment of the subject, including detailed diagrams, charts and tables. The importance of the study of condensation nuclei to the meteorologist is emphasized. Appended are tables of nuclei concentrations in various continental and oceanic areas. Excellent bibliography included. (*Same item as* A 88, Jan. 1950, *MAB.*) *Subject Headings:* **1. Monographs on nuclei 2. Nuclei bibliographies 3. Nuclei geographical distribution.**

1939

6H–126 551.574.1(431/5)

†Burckhardt, Hans and Flohn, Hermann, **Die atmosphärischen Kondensationskerne; in ihrer physikalischen, meteorologischen und bioklimatischen Bedeutung.** [Atmospheric condensation nuclei; their physical, meteorological and bioclimatological significance.] Berlin, Julius Springer, **1939.** 128 p. 23 figs., 34 tables, 75 refs. **DLC**—Brief historical survey serves as an introduction

to a comprehensive monograph on condensation nuclei which summarizes the results of nuclei content measurements made by various establishments of the Reichsamt für Wetterdienst and makes use of published investigations arranging their data in a specific way. Nuclei observation network is given on map. Pt. 1. Takes up the physical importance of condensation nuclei; Pt. 2. Climatology and meteorology of condensation nuclei; Pt. 3. Bioclimatic importance of condensation nuclei; Pt. 4. Results of nuclei and dust content in the West Saxonian Mittelgebirge; Pt. 5. Nuclei count in Braunlage in Harz. (*See also* A–70, Jan. 1950, *MAB.*) *Subject Headings:* **1. Monographs on nuclei 2. Nuclei bibliographies 3. Germany.**—*N.A.S.*

6H–127 551.574.1

Findeisen, S., **The colloid meteorological processes in the formation of precipitation.** (In his: **Selected Papers on the Physics of Condensation and Precipitation.** [3 papers trans. from the original German by A. R. Stickley, **1939.**] p. 1–21. 22 refs.) **DWB**—Condensation nuclei and sublimation nuclei are discussed in connection with temperature and humidity conditions; their size and number are roughly estimated. It is stated that the trend of the weather can be essentially changed by a deficiency in the effective sublimation nuclei in the atmosphere. (*Same item as* C–25, March 1950, *MAB.*) *Subject Headings:* **1. Nuclei size 2. Sublimation nuclei 3. Nuclei deficiency 4. Nuclei and temperature 5. Nuclei and humidity.**—*N.A.S.*

6H–128 551.574.1

Findeisen, W., **Formation of rain clouds.** (In his: **Selected Papers on the Physics of Condensation and Precipitation.** [3 papers trans. from the original German by A. R. Stickley, **1939.**] **DWB.** Original German in *Zeitschrift für angewandte Meteorologie*, 55(7):208–225, **1938. DWB**—The physical basis of ice cloud formation is discussed from the viewpoint that these clouds "do not under any condition arise from water clouds due to the freezing of the water drops but they arise by sublimation, that is, by the deposition of ice crystals on the sublimation nuclei." Explanations of the nature of nuclei and their activity are given. *Subject Headings:* **1. Sublimation nuclei 2. Findeisen theory.**—*N.A.S.*

6H–129 551.574.1

†Findeisen, W., **Die Kondensationskerne. Entstehung, chemische Natur, Grösse und Anzahl.** [Condensation nuclei: origin, chemical nature, size and quantity.] *Beiträge zur Physik der freien Atmosphäre*, Strasbourg, 25(3):220–232, **1939.** 2 tables, 35 refs. **DLC**—Proceeding from the postulate that condensation of water vapor can occur only on suspended nuclei in the atmosphere, the author presents a thorough discussion of observations made by other authors, reviewing the results of 35 works trying to prove the correctness of his theory. *Subject Headings:* **1. Nuclei source 2. Nuclei size 3. Literature reviews 4. Findeisen theory.**—*N.A.S.*

6H–130 551.574.1:551.510.42

†Karpov, A. N., **K istorii i metodam issledovaniia atmosfernoĭ pyli.** [History and methods of atmospheric dust investigations.] *Meteorologiia i Gidrologiia*, Moscow, No. 3:92–98, March **1939.** fig., 56 refs., 4 eqs. **DLC**—Historical survey of the development of knowledge and methods in the field of dust investigations. Some works in the Trans-Volga region are mentioned, where the vertical distribution of dust content has been studied by means of aeroscopes carried by kites. References include Russian and foreign works. *Subject Headings:* **1. Literature reviews 2. Dust nuclei 3. Dust vertical distribution 4. Methods of dust investigation 5. U.S.S.R.**—*N.A.S.*

6H–131 551.574.1(6)

***Lettau, Heinz, **Kern- und Staubgehalt der Bodenluft und die atmosphärische Schwächung der Sonnenstrahlung über Afrika und den angrenzenden Meeren.** [Surface nuclei and dust content, and the atmospheric weakening of solar radiation over Africa and the adjoining seas.] *Beitrage zur Geophysik*, Leipzig, 55(1):103–137, **1939.** 12 figs., 15 tables, 20 refs. **DLC**—Crossing the African continent from German East Africa to Portuguese Angola, the author made observations of nuclei concentration with a Scholz-Schulze counter and made dust measurements with a Zeiss conimeter. Fifteen tables present the results. Geographical distribution of nuclei along the route was very homogeneous, giving from 3000 to 4000 nuclei per cm^3. *Subject Headings:* **1. Nuclei geographical distribution 2. Africa.**—*N.A.S.*

6H–132 551.574.1

Lettau, Heinz, **Versuch einer Bilanz im Kondensationskern-Haushalt der Troposphäre im Durchschnitt für die ganze Erdoberfläche.** [Attempt to balance condensation nuclei economy of the troposphere for the entire earth's surface.] *Annalen der Hydrographie und Maritimen Meteorologie*, Hamburg, 67:551–559, **1939.** 2 tables, 23 refs., eqs. **DLC**—A theoretical discussion along the lines of: 1) total number of condensation nuclei in the troposphere, 2) nuclei generating processes and

3) nuclei annihilating processes. Vertical distribution of nuclei up to 8 km is given in a table. *Subject Headings:* **1. Nuclei formation 2. Nuclei decay 3. Nuclei vertical distribution.**—*N.A.S.*

1940

6H–133 551.574.1:551.594.12

*Lissovski, P., **Das Laden von Aerosolteilchen in einer bipolaren Ionenatmosphäre.** [The charge of aerosol particles in a bipolar ion atmosphere.] *Acta Physicochimica U.S.S.R.*, Moscow, 13(2):157–192, **1940.** 4 figs., 14 tables, 14 refs., 48 eqs. **DLC**—A comprehensive theoretical treatment of this very little investigated subject and detailed description of methods used in author's experiment for determining the stationary distribution of particles with sizes of 1.0–2.0μ according to the magnitude of their charges. It was found that the charges of particles are not quite symmetrically distributed and the number of the negatively charged particles is about 10% greater than that of the positively charged ones. *Subject Headings:* **1. Charged nuclei 2. Ion variations.**—*N.A.S.*

6H–134 551.574.1:551.574.7

Speranza, Francesco, **Nuclei di condensazione e soprassaturazione: umidità relative specifica e depositi di ghiaccio al carburatore dei velivoli.** [Nuclei of condensation and supersaturation: relative and specific humidity, and deposits of ice on airplane carburetors.] *Revista di Meteorologia Aeronautica*, Rome, 4(2):38–47, **1940.** 2 figs., 3 eqs. **DLC**—In 1875 COULIER and in 1880 AITKEN discovered that water vapor would not condense without the presence of condensation nuclei. Later discoveries regarding the number of nuclei before and after rain, with or without wind, in lowlands and mountains, etc. were reported by the above authors and by LANDSBERG. The effect of supersaturation is treated as well as the degree of supersaturation possible (varying from 106% to 300% according to different authors or under varying conditions of nuclei size, temperature, etc.) and, finally, the application of the best empirical-theoretical curves or tables to the problem of removal (or prevention) of carburetor icing in airplanes, considering the rapidly increasing vapor pressure with increasing temperatures, especially above 0°C (ice can form in carburetors with ambient air temperature above 0° but <25°C). (*Same item as* I–64, Sept. 1950, *MAB.*) *Subject Headings:* **1. Literature reviews 2. Nuclei geographical distribution 3. Supersaturation.**—*M.R.*

6H–135 551.574.1(261)

Wright, H. L., **Sea-salt nuclei: the origin of sea-salt nuclei.** *Royal Meteorological Society, Quarterly Journal*, 66:3–11, 11–12, **1940.** fig., 3 tables, 23 refs., eqs. **DLC**—Very instructive discussion on the origin, composition and behavior of sea salt nuclei and characteristic figures of nuclei count made in the Atlantic and Pacific Oceans and in tropical seas. The curve of size distribution of fog droplets at Round Hill is approximately a probability curve. *Subject Headings:* **1. Salt nuclei 2. Nuclei size 3. Atlantic Ocean 4. Pacific Ocean 5. Tropical seas.**—*N.A.S.*

1941

6H–136 551.574.1:551.576.1

Andreev, N. N., **Usloviia kondensatsii vody v atmosfere.** [Conditions for water condensation in the atmosphere.] *Meteorologiia i Gidrologiia*, Moscow, No. 4:10–12, **1941.** 2 figs., table. **DWB**—The author discusses the statement that water condensation in the atmosphere is induced by "condensation centers," mainly electrolytes. He tries to prove that not all the electrolytes induce condensation and sometimes this process is so weak that it is of no importance. The crystals of NaCl in a humid atmosphere absorb water when a saturated solution with a certain vapor tension for a given temperature is first formed as a film over the crystal. Water condensation occurs only when the vapor tension of the saturated solution of the electrolyte is lower than the vapor tension in the surrounding air. The author concludes that the condensation centers (nuclei) are of a secondary importance in processes of cloud formation and clouds can be formed only by the cooling of a rising air mass. *Subject Headings:* **1. Salt nuclei 2. Electrolytic nuclei 3. Cloud formation.**—*N.A.S.*

6H–137 551.574.1:551.575.1

Cunningham, Robert H., **Chloride content of fog water in relation to air trajectory.** *American Meteorological Society, Bulletin*, 22:17–20, **1941.** 2 figs., table, ref. **DLC**—During the summer of 1939 fog samples were collected in the Bay of Fundy at Kent Island for studying the chemical properties of fog in relation to the air mass type. Trajectories of air particle motion are shown on map. A definite correlation between the trajectory of the air and the amount of chloride in the fog was found. More chloride was detected in samples of fog taken from air that had travelled over warm water recently, than in samples of air that had travelled only over cold water. *Subject Headings:* **1. Chloride nuclei 2. Salt nuclei 3. Nuclei and air masses 4. Kent Island, Bay of Fundy.**—*N.A.S.*

6H–138 551.574.1

Gish, O. H. and Phillips, Marcella L., **Errors in measurements of condensation nuclei.** *American Geophysical Union, Transactions*, Pt. 2:432–434, **1941.** 4 figs., 3 refs. **DLC**—In using an expansion-chamber for nuclei count, one has to consider that the number of nuclei will vary from sample to sample according to some law of probability, even though the count is correct and the samples are all taken from the same parent population. SCRASE showed that these counts should be distributed according to the Poisson law of probability, namely $Y = Ne^{-u}\mu^x/x$, where (Y/N) is the probability of the occurrence of a certain count; x and μ is the mean of all N counts where N is large. An important feature of this law is that the variance (square of the standard deviation σ) is equal to the mean or $\sigma^2 = \mu$. The conclusion is reached that with the equipment and technique used in this investigation the variance of ten successive counts from a common population is on the average not more than 70% of the mean. *Subject Headings:* **1. Nuclei measurement errors 2. Statistical methods.**—*N.A.S.*

6H–139 551.574.1

Obolenskiĭ, V. N., **Dopolneniĭa i utochneniĭ k teorii atmosfernoĭ kondensatsii.** [Additions and corrections to the theory of condensation in the atmosphere.] *Meteorologiĭa i Gidrologiĭa*, Leningrad, No. 3:10–18, March **1941.** table, 18 refs., 14 eqs. **DWB**—The conception of condensation nuclei needs some clarification since there are controversial opinions about their nature. The majority of investigators assume that nuclei in the atmosphere are soluble particles of salts and droplets of acids, but more recent works show that nuclei are wettable, but not soluble, particles of various types and also fine dust particles. Referring to theories of WIGAND, JUNGE, KÖHLER and FINDEISEN, the author concludes that both types can serve as condensation nuclei, differing only in the rate of supersaturation required for producing cloudy condensation. Insoluble nuclei require a saturation 10–40 times greater than soluble ones. Dimensions of both types of nuclei and the rate of supersaturation are shown in table. Condensation theory is treated mathematically using THOMSON's formula and GIBBS-FOLMER phase transition theory. *Subject Headings:* **1. Nuclei theories 2. Soluble nuclei 3. Insoluble nuclei 4. Salt nuclei 5. Acid nuclei 5. Nuclei size.**—*N.A.S.*

6H–140 551.574.1:551.576.1

Regener, Erich (*Friedrichshafen/B.*), **Versuche über die Kondensation und Sublimation des Wasserdampfes bei tiefen Temperaturen.** [Experiments on condensation and sublimation of water vapor with low temperatures.] *Deutsche Akademie der Luftforschung, Munich, Schriften*, No. 37-17-24, Sitzungsperiode **1940/1941,** pub. **1941.** fig. **DLC**—Results of laboratory studies at low temperatures (to −60°C) are summarized and discussed and the equipment for reducing pressure and temperature and control of humidity (supersaturation), condensation or sublimation nuclei is illustrated and described. Tentative conclusions were that automatic freezing does not occur in pure vapor until −60°C or lower, that salt or quartz particles lead to condensation above −15°C and sublimation below, with rapid expansion. Ozone did not give sublimation, but α-ray ionization did when high rates of expansion were used. Filtering or keeping out ice dust, which would always produce sublimation, was a major problem. More accurate measurements were considered necessary for certain determination. *Subject Headings:* **1. Nuclei experiments 2. Supercooled water clouds 3. Sublimation process.**—*M.R.*

6H–141 551.574.1

Simpson, George C., **Sea-salt and condensation nuclei.** *Royal Meteorological Society, Quarterly Journal*, 67(290):99–133, April **1941.** 5 figs., 7 tables, 24 refs. **DLC**—A logarithmic scale of lengths, extending from 6×10^{-8} cm to 1 cm is given for nuclei, cloud particles and raindrops. "Landmarks" on this scale show the limit of unaided vision, limit of microscopic vision, limit of ultra-microscopic vision and the wavelength of visible light. The physics of condensation is explained and diameters of hygroscopic and nonhygroscopic nuclei requiring various supersaturation for condensation are given in a table. Characteristic data on nucleus contents of the atmosphere in different types of localities, on nuclei size, mobility, nature and origin are thoroughly discussed. (*See also* C–46, March 1950, *MAB.*) *Subject Headings:* **1. Nuclei size 2. Nuclei mobility 3. Nuclei sources.**—*N.A.S.*

1942

6H–142 551.574.1:551.578.41

Findeisen, W., **Experimentelle Untersuchungen über die Eisteilchenbildung.** [Experimental research on ice particle formation.] *Meteorologische Zeitschrift*, 59(11):349–353, Nov. **1942.** 11 refs. **DWB**—Discussion of sublimation nuclei and their effectiveness concerning the formation of atmospheric ice particles. (*Same item as* C–47, March 1950, *MAB.*) *Subject Headings:* **1. Sublimation nuclei 2. Ice crystal formation.**

6H–143 551.574.

Wall, E., **Einfaches Schema der atmosphärischen Eiskernbildung.** [A simple scheme of th formation of atmospheric nuclei.] *Meteorologische Zeitschrift*, 59(6):177–180, June **1942.** 2 figs foot-refs., 2 eqs. **DLC**—A simple scheme of atmospheric nuclei formation is suggested on th assumption that the real nuclei are capable, under certain conditions, of affecting not only condensa tion but also ice formation, and that this double effect can be characterized by two parameters—th equivalent water and ice radius. *Subject Headings:* **1. Nuclei formation 2. Ice formation.**—*N.A.S.*

6H–144 551.574.1:551.576.

Wall, E., **Material zur Frage der Eiskernbildung in der Atmosphäre.** [Material on the problen of ice nuclei formation in the atmosphere.] *Meteorologische Zeitschrift*, 59(4):109–120, April **1942** 17 foot-refs. **DLC**—The new theory of precipitation and its implications on the formation of ic nuclei are discussed from the physical and meteorological viewpoint. It is proved that the give observations indicate no original ice nuclei formation. It is much more likely that ice nuclei forma tion generally sets in only after saturation with water vapor has been reached. This has been prove already by L. KRASTANOV in agreement with M. VOLMER. This ice nuclei formation is, as a rule associated with supercooled water clouds. *Subject Headings:* **1. Ice nuclei 2. Nuclei formatio 3. Supercooled clouds.**—*Trans. from author's abstract.*

6H–145 551.574.1:551.576.

Weickmann, H., **Experimentelle Untersuchungen zur Bildung von Eis und Wasser an Keime bei tiefen temperaturen.** [Experimental investigations on the formation of ice and water on nucle at low temperatures.] *Zentrale für wissenschaftliche Berichte der Luftfahrtforschung, Berlin-Adlersho Forschung Bericht*, No. 1730, **1942.** (Original unchecked.) Trans. by Mrs. VICTOR CONRAD, a *U. S. Air Force. Air Materiel Command, Technical Report*, No. 5676, (Harvard-Mount Washingto Icing Research Report 1946/1947), p. 484–594, June **1948.** 60 figs., graphs. 40 refs. **MH-BH**— The view is presented that most ice clouds form at or near water saturation and that the hypothetica sublimation nuclei, which have not as yet been established by systematic investigations, are non other than freezing nuclei. Questions of crystallization discussed. Forms of atmospheric ic crystals are explained. (*Same item as* C–50, March 1950, *MAB.*) *Subject Headings:* **1. Sublimatio nuclei 2. Ice crystal formation.**

1943

6H–146 551.574.

Linke, F., **Kondensationskerne im Elektronenmikroskop sichtbar gemacht.** [Condensatio nuclei made visible in the electron microscope.] *Naturwissenschaften*, Berlin, 31(19/20):230–23 **1943.** 2 figs. **DLC**—Concise, but very instructive, treatise on developments of practical method in the study of condensation nuclei. Brief survey of contributions made by WILSON, AITKEN ISRAËL, BURCHARD and BOEDEKER is followed by description of condensation nuclei characteristic found by the author in the indoor air in Frankfurt on Main, Germany, with an electron microscope Photos show condensation nuclei of organic and crystal origin magnified 30,000 times. The radii of nuclei varied between 25 and 100 mμ with the highest frequency of 50 mμ. *Subject Heading* **1. Nuclei size 2. Organic nuclei 3. Crystalline nuclei 3. Electron microscope analysis 5. Frank furt a/M., Germany.**—*N.A.S.*

6H–147 551.574.

Wall, Ernest, **Die Eiskeimbildung in Lösungskernen.** [Ice nuclei formation in solvent nuclei. *Meteorologische Zeitschrift*, 60:94–104, **1943.** 5 figs., foot-refs., eqs. **DLC**—An investigation o solvent nuclei and their role in ice nuclei formation. Conditions under which ice nuclei are forme through the freezing of solvent nuclei are analyzed. *Subject Headings:* **1. Soluble nuclei 2. Nucle formation 3. Ice nuclei.**—*N.A.S.*

1945

6H–148 551.574.1(46

*Vidal Llenas, Jose M., **Conductibilidad eléctrica del aire.** [Electrical conductivity of air. *Spain. Servicio Meteorológico Nacional, Publicación, Ser. A*, No. 17, **1945.** 79 p. 33 figs., tables 28 refs., 6 eqs. **DWB**—In this monograph on methods for determining the conductivity of ai measurements are also given of condensation nuclei and ionization which show the difference between the outskirts and the center of Barcelona. (*Same item as* 3.1–180, Jan. 1952, *MAB. Subject Headings:* **1. Nuclei in city air 2. Barcelona, Spain.**—*N.A.S.*

1947

6H–149 551.574.

Cwilong, B. M., **Sublimation in a Wilson chamber.** *Royal Society of London, Proceeding Ser. A*, 190:137–143, **1947.** 2 figs., table, 10 refs. **DLC**—Experiments on condensation of wate

vapor in both dust-free and ordinary air are made. Clouds are considered made up of supercooled water drops. Table summarizes experiments, type of air, expansion ratio, temperature (initial and after expansion), and products of expansion. Author says more evidence is necessary to determine role of sublimation nuclei. (*Same item as* C-59, March 1950, *MAB.*) *Subject Heading:* **1. Sublimation nuclei.**

6H-150 551.574.1:551.575.1

Ertel, Hans, **Über die Akkumulation von Chlor-Ionen in driftenden Meernebeln.** [On the accumulation of chlorine ions in drifting sea fog.] *Zeitschrift für Meteorologie*, Berlin, 1(7):213-215, April **1947.** 10 refs., eqs. **DWB**—Theoretical study of the process of accumulation of chlorine ions in drifting sea fog. (*Same item as* 10-121, Oct. 1950, *MAB.*) *Subject Headings:* **1. Chloride nuclei 2. Sea fog.**—*N.A.S.*

6H-151 551.574.1:551.508.91

Wall, Ernst, **Geschichtliches und kritisches zum Problem der Kondensationskerne. John Aitken.** [Historical and critical review on the problem of condensation nuclei. John Aitken.] *Germany. Deutscher Meteorologischer Dienst im Französischen Besatzungsgebiet, Wissenschaftliche Arbeiten*, 1:180-186, **1947. DLC**—A review of the works of JOHN AITKEN on condensation nuclei and their measurement. *Subject Headings:* **1. Literature reviews 2. Nuclei instruments 3. Aitken, John.**—*M.R.*

1948

6H-152 551.574.1

Dessens, Henri, **Noyaux de condensation et pluie artificielle.** [Condensation nuclei and artificial rain.] *Académie des Sciences, Paris, Comptes Rendus*, 226:506-507, **1948.** table. **DWB**—Discussion of the qualities and effectiveness of various chemical compounds that can be used as hygroscopic nuclei, taking into consideration droplet surface tension differences. (*Same item as* C-70, March 1950, *MAB.*) *Subject Heading:* **1. Hygroscopic nuclei.**

6H-153 551.574.1:551.510.42

Falconer, Raymond E. and Vonnegut, Bernard, **Smoke from smelting operations as a possible source of silver iodide nuclei.** General Electric Research Laboratory, Schenectady, N. Y., Contract DA-36-039-Sc-15345, Project Cirrus, Occasional Report, No. 4, July 15, **1948.** 4 p. 2 figs., 4 refs. **DWB**—Possibility that silver iodide from smelter stacks might increase rainfall is investigated by comparing rainfall data for various states with high smelter production. No significant correlation could be found. (*Same item as* A-210, Jan. 1950, *MAB.*) *Subject Heading:* **1. Silver iodide nuclei.**

6H-154 551.574.1(261)

Hess, Victor F., **On the concentration of condensation nucle in the air over the North Atlantic.** *Terrestrial Magnetism and Atmospheric Electricity*, Wash., D. C., 53(4):399-403, Dec. **1948.** 2 tables, 10 refs. **DLC**—Measurements of the nucleus content of the air during a voyage from New York to Le Havre, France and back were made using an Aitken pocket dust counter (modified model, after G. LUEDELING). Results obtained are listed in tables together with some meteorological and nautical data taken at the time of the individual countings. The smallest nucleus content ($N = 78$) was found half way across the ocean in polar air with northeast wind. From 400 to 600 nuclei per cc are almost always found over the ocean. *Subject Headings:* **1. Nuclei geographical distribution 2. Nuclei in polar air 3. Atlantic Ocean.**—*N.A.S.*

6H-155 551.574.1(437)

*Menzl, Oswald (*Kinding, Kr. Eichstätt, Bayern*), **Kernzählungen auf dem Donnersberge.** [Nuclei counts on the Donnersberg.] *Naturforschende Gesellschaft, Zurich, Vierteljahresschift*, 93(3):204-214, Sept. 30, **1948.** 3 figs., 8 tables, 22 refs. **DLC**—Report on measurements of the number of nuclei made from April 17 to June 24, 1934. Results are given for different air masses and the diurnal course is shown as well as the relationship to sunshine, wind direction, visibility, moisture, cloudiness and height. (*Same item as* 4.9-160, Sept. 1953, *MAB.*) *Subject Headings:* **1. Nuclei diurnal variations 2. Nuclei and air masses 3. Nuclei and sunshine 4. Nuclei and cloud 5. Donnersberg, Czechoslovakia.**—*A.A.*

6H-156 551.574.1:551.510.42

Neuberger, H., **Condensation nuclei: their significance in atmospheric pollution.** *Mechanical Engineering*, N. Y., 70(3):221-5, March **1948.** fig., 5 tables, 20 refs. **DLC**—Discussion of pollution. What may seem foreign to air is often an integral part of it. Atmospheric constituents discussed including "aerosols" of which there are two types, 1) neutral particles or dust and 2) condensation nuclei, "active" dust. Chemical nature of condensation nuclei, sources, physical properties; com-

parison between two types of aerosol as to concentration, distribution, weather effects, and biological effects. (*Same item as* A-217, Jan. 1950, *MAB.*) *Subject Heading:* **1. Nuclei sources.**

6H-157 551.574.1(417

Richter, Gertraud, **Der Kerngehalt der Luft in Karlsbad.** [The nuclei content of air in Karlsbad.] *Meteorologische Rundschau*, Berlin, 1(9/10):273-275, March/April **1948.** fig. **DLC**—Nuclei count was made in July and Aug. 1943 at 18 points in the resort area. 300 measurements were obtained, giving on the average 9800 nuclei per cm^3 of air. Distribution in space and diurnal variations are discussed. *Subject Headings:* **1. Nuclei count 2. Nuclei diurnal variations 3. Karlovy Vary.**—*N.A.S.*

6H-158 551.574.1:551.508.9

Salles, E., **Remarques sur la teneur de l'air en noyoux de condensation, en la compagne.** [Note on the condensation nuclei content of air in the country.] *La Météorologie*, Paris, Ser. 4, No. 12, 300-303, Oct. Dec. **1948. DWB**—Data obtained by the author with two types of Aitken nuclei counter (the Pocket and the Portable) in various parts of France, show the frequency or distribution of nuclei in 3 localities, including one large town, one small coastal village and one forest area. These are compared with data published by LANDSBERG for rural districts inland and along the coasts and for cities, respectively. The author obtains lower values than the averages of LANDSBERG; agrees with those of AITKEN and LÀ along the Riviera; but much higher than in Scotland or Ireland. (*Same item as* 4.5-158, May 1953, *MAB.*) *Subject Headings:* **1. Nuclei geographical distribution 2. Aitken nuclei counter. I. Landsberg, Helmut E.**—*M.R.*

6H-159 551.574.1:551.578.4

†Schwerdtfeger, W., **Comparison for the conditions for the formation of water drops and ice particles.** English trans. in *U. S. Air Force. Air Materiel Command, Technical Report*, No. 5676 (Harvard-Mount Washington Icing Research Report 1946-1947), p. 595-635, June **1948.** 3 figs. 33 refs., 18 eqs. **MH-BH**—It is stated that even if the secondary formation of ice germs in the free atmosphere plays an important role in formation of atmospheric ice particles, it is not necessary that all nuclei well-fitted for condensation have the same qualification for the formation of ice germs. Thus with the assumption of the formation of secondary ice germs it would be possible to keep up the conception of an occasional lack of sublimation nuclei (after FINDEISEN). Facts concerning the formation of water drops and ice particles are considered; hygroscopic effect of the dissolved nuclei substance and the influence of the curvature of the surface upon the equilibrium of the vapor pressure etc., are discussed. (*Same item as* C-75, March 1950, *MAB.*) *Subject Headings:* **1. Ice crystal formation 2. Sublimation nuclei.**

1949

6H-160 551.574.1:551.578.1(26

Byers, Horace R., **Condensation nuclei and precipitation.** *Journal of Meteorology*, Boston, 6(5):363, Oct. **1949. DWB**—Correspondence: Low nuclei counts over oceans are noted, a factor to be considered in explanation of rain cloud development in clouds at above freezing temperature over tropical oceans. (*Same item as* C-79, March 1950, *MAB.*) *Subject Headings:* **1. Nuclei geographical distribution 2. Nuclei over tropical oceans.**

6H-161 551.574.1:551.586.

†Cauer, H., **Ergebnisse chemisch-meteorologischer Forschung. Fragen der Wolkenbildung unter chemischem, elektrostatischem und elektromagnetischem Einfluss.—Bioklimatische Betrachtungen.** [Results of chemical-meteorological research. Questions of cloud formation under chemical, electrostatic and electromagnetic influences.—Bioclimatic considerations.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B.*, 1(3/4):221-256, Nov. **1949.** data, 62 refs. German, English, French and Spanish summaries. **DWB, MH-BH**—Chemical meteorology is chiefly concerned with formation of clouds. A detailed and technical investigation is made on the origin and nature of condensation and sublimation nuclei: amount, origin, distribution and development and circulation of iodine in the air under the influence of light and ozone; development, occurrence, daily variation and the coagulating of fog nuclei; forming effect of ozone. The spirit water theory is checked. New theoretical considerations on the chemical separation of droplets by wind dispersion are treated. Electric properties of droplets and physicochemical, electrostatic and electromagnetic causes of condensation are developed. (*Same item as* C-80, March 1950, *MAB.*) *Subject Headings:* **1. Nuclei sources 2. Iodine nuclei 3. Sublimation nuclei.**—*C.E.P.B.*

6H-162 551.574.

Fournier d'Albe, E. M., **Some experiments on the condensation of water vapour at temperatures below 0°C.** *Royal Meteorological Society, Quarterly Journal*, 75:1-14, Jan. **1949.** fig., 7 refs. **DL**

—Apparatus is developed for ultramicroscopic observation of behavior of individual condensation nuclei. Particular attention is paid to problems of distinguishing between water droplets and ice crystals and of determining conditions necessary for formation of the latter. Outdoor air nuclei and artificial nuclei are examined. (*Same item as* C–82, March 1950, *MAB.*) *Subject Headings:* **1. Nuclei instruments 2. Ice crystal formation.**

6H–163 551.574.1:551.575.1

Heverly, J. R., **Similitude of artificial and natural fogs.** *American Geophysical Union, Transactions*, 30(1):15–18, Jan. **1949.** 2 figs., 4 tables, 4 refs. **DWB**—Experimental studies of condensation nuclei and laboratory fog investigations are made. (*Same item as* C–83, March 1950, *MAB.*) *Subject Headings:* **1. Nuclei experiments 2. Artificial fog.**

6H–164 551.574.1:551.576.11

Howell, Wallace E., **The growth of cloud drops in uniformly cooled air.** *Blue Hill Meteorological Observatory, Reprint*, No. 6, **1949.** p. 134–149. 16 figs., 5 tables, 30 refs. **MH-BH**—Study is made of drop size spectrum when air containing condensation nuclei is uniformly cooled. (*Same item as* C–86, March 1950, *MAB.*) *Subject Heading:* **1. Nuclei experiments**

6H–165 551.574.1:551.576.11

†*Howell, Wallace E.; Wexler, Raymond and Braun, Seymour, **Contributions to the theory of the constitution of clouds.** Mount Washington Observatory, Contract AF (099)-25, Quarterly Progress Report, Jan. 20, **1949.** 14 p. 3 figs., 15 refs. **Appendix of cloud data observations, Oct./Dec. 1948. MH-BH**—As preliminary to undertaking a series of integrations of cloud droplet growth, a study of the size spectrum of atmospheric condensation nuclei is presented, leading to the adoption of a nuclei size distribution based on observations by Woodcock as the starting point for the integrations. (*Same item as* C–85, March 1950, *MAB.*) *Subject Heading:* **1. Nuclei size.**—*From authors' abstract.*

6H–166 551.574.1:551.586(431/5)

Leistner, Walter, **Das maritime Kernaerosol und seine Änderung landeinwärts.** [The maritime nuclear aerosol and its change inland.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, 1:68–73, **1949.** 3 figs., 10 refs. **MH-BH**—Average number of nuclei per cc is: towns, 50–100,000; health resorts of Mittelgebirge, 8000; Wyk on Fohr, 4000; summit of Mittelgebirge, 1–3000; Zugspitze, 400. This is a measure of the purity of the air. Nature of nuclei varies with origin. Condensation processes are summarized. Daily observations at Wyk with Schulz nuclei counter showed maximum frequency (up to 7000 per cc) with winds from NE and minimum from WNW–SSW (sea winds, W.3200). Maximum frequency with strong winds (spray). Number of salt nuclei decreases by 20–30% from sea edge to roof of house 100 m inland. Only finest particles taken into body. (*Same item as* 8–82, Aug. 1950, *MAB.*) *Subject Headings:* **1. Nuclei sources 2. Nuclei and wind 3. Salt nuclei 4. Health resorts 5. Mittelgebirge, Germany.**—*C.E.P.B.*

6H–167 551.574.1:551.515.8(437)

*Menzl, Oswald, **Kernzählungen im Böhmischen Mittelgebirge.** [Nuclei counts in the Bohemian Mittelgebirge.] *Meteorologische Rundschau*, Berlin, 2(1/2):45–48, Jan./Feb. **1949.** 6 tables, 13 refs. German summary p. 45. **MH-BH**—Counts of nuclei on Donnersberg at heights of 520 to 853 m in different air masses, wind directions and velocities, visibilities, sky tints, humidities and cloud amounts are expressed in numerous tables. Local differences are investigated. Whirled-up dust and pollen were found to increase the counts, even in rain-squalls. (*Same item as* 2–138, Feb. 1950, *MAB.*) *Subject Headings:* **1. Nuclei and air masses 2. Nuclei and wind 3. Nuclei and visibility 4. Nuclei and cloudiness 5. Donnersberg, Czechoslovakia.**—*C.E.P.B.*

6H–168 551.574.1:551.510.42

Neuberger, H., **Air pollution.** *Mineral Industries*, State College, Pa., 18(5):1–3, Feb. **1949. DLC**—In this discussion on air pollutants, the suspended material known by the collective term "aerosol" is classified as dust particles and condensation nuclei. Nuclei are active and dust is ordinarily inactive with respect to condensation of water vapor. The size of average nuclei is about ten times smaller than that of an average dust particle, and its size depends more or less upon the air humidity, since the kernels start growing when the relative humidity rises above 70%. Due to smaller size, condensation nuclei are less subject to sedimentation, they usually outnumber the dust particles many times and are easily transported by air currents to higher latitudes. Less than 1000 dust grains/cm³ and more than 200,000 nuclei may be counted in city air. *Subject Headings:* **1. Nuclei count 2. Dust nuclei 3. Nuclei in city air.**—*N.A.S.*

6H–169 551.574.1:551.576.11

Ogiwara, Sekiji, **On the air temperature and the growth of cloud particles in convective clouds. Pt. 1, Studies on the formation of cloud and rain.** *Tohoku Univ., Science Reports, 5th Ser., Geophysics*, 1(1):21–23, Feb. **1949.** fig., refs., 5 eqs. **DWB**—Author studies the distribution of the temperature of the air and the growth of cloud particles in the ascending current which contains condensation nuclei. (*Same item as* C–88, March 1950, *MAB.*) *Subject Headings:* **1. Nuclei and temperature 2. Nuclei and clouds.**

6H–170 551.574.1:551.578.1

Ogiwara, Sekiji, **On the formation of rain drops in clouds which are entirely composed of water. Pt. 2, Studies on the formation of cloud and rain.** *Tohoku Univ., Science Reports, 5th Ser., Geophysics*, 1(2):83–86, Nov. **1949.** 3 figs., 3 refs., 6 eqs. **DWB**—Calculations are made to obtain the rate of growth of rain drops by coagulation due to relative rates of fall, disregarding the effect of turbulence of the air. The BERGERON-FINDEISEN theory of ice crystal nuclei is disputed. (*Same item as* C–89, March 1950, *MAB.*) *Subject Headings:* **1. Ice nuclei 2. Bergeron-Findeisen nuclei theory.**

6H–171 551.574.1:523.78

Ohta, S., **Measurements of condensation nuclei. In Report of solar eclipse observation May 9, 1948.** *Geophysical Magazine*, Tokyo, 19(3–4):165–169, Dec. **1949.** 2 figs., 8 refs. **MH-BH**—Continuous observations on condensation nuclei were made for seven days including day of solar eclipse, May 9, 1948, at Rebun Island, Japan in atmospheres free of artificial pollution. Total nuclei were counted with Aitken counter and charged nuclei by SCRASE's method. On clear days total number of nuclei increased at midday; on a cloudy day it remained fairly constant. The number of uncharged nuclei remained constant during all observations. On day of eclipse midday increase in number of nuclei was about 20% less than on clear days. The daily change in nuclei which is a local phenomenon, may be attributed to the drying effect which low atmospheric humidity and sunshine exert upon sea water or sea spray. (*Same item as* 2.4–125, April 1951, *MAB.*) *Subject Headings:* **1. Nuclei diurnal variations 2. Solar eclipses 3. Japan.**—*I.L.D.*

6H–172 551.574.1:551.594.12

†*Persano, Aldo, **I nuclei di condensazione.** [Condensation nuclei.] *Rivista di Meteorologia Aeronautica*, Rome, 9(3):3–20, July/Sept. **1949.** 10 figs., 6 tables, 21 refs., eqs. Italian, French, English and German summaries p. 3. **MH-BH**—A comprehensive review of the principle theories on origin of nuclei of condensation as set forth by AITKEN, WIGAND, KÖHLER, SIMPSON, FINDEISEN, DESSENS, WRIGHT and others. Illustrations showing diameter and frequency distribution of various nuclei under varying conditions taken from SIMPSON, WRIGHT and DESSENS together with tabular data from similar sources. Origin of nuclei from evaporation of sea spray is suggested. Ionization and charges on particles discussed in detail. (*Same item as* 4–101, April 1950, *MAB.*) *Subject Headings:* **1. Literature reviews 2. Nuclei sources 3. Nuclei size 4. Charged nuclei.**—*M.R.*

6H–173 551.574.1

Rodebush, W. H., **Nuclei in evaporation and condensation.** *Chemical Reviews*, Baltimore, 44:269–276, April **1949.** 3 figs., 6 refs., eq. **DLC**—Discussion of nonpolar gases in water solution. Stated that nuclei of evaporation and condensation become bubbles or drops. Supersaturation of vapors in the absence of nuclei is treated. (*Same item as* K–176, Nov. 1950, *MAB.*) *Subject Headings:* **1. Nuclei modification 2. Supersaturation.**

6H–174 551.574.1:551.509.6

Schaefer, Vincent J., **The formation of ice crystals in the laboratory and the atmosphere.** *Chemical Reviews*, Baltimore, 44(2):291–320, April **1949.** 22 figs., 5 tables, 20 refs. **DLC**—Summary of author's laboratory and field activities in experimental meteorology. Properties of snow particles and electrical characteristics are discussed. Techniques for detecting sublimation nuclei in the free atmosphere are given, involving cold chamber and supercooled films. Description of technique and procedure used in simulating natural clouds. Role of dust particles as sublimation nuclei. Effect on the crystal habit of ice produced by the blocking action of adsorbed surface active polar molecules is shown. Some aspects of the cloud modification studies initiated by the author in 1946 are described, with some observed results and discussion of relationships believed to exist in unstable clouds. (*Same item as* C–93, March 1950, *MAB.*) *Subject Headings:* **1. Ice crystal formation 2. Sublimation nuclei 3. Cloud seeding.**

6H–175 551.574.1:551.578.4

Vonnegut, Bernard, **Note on nuclei for ice crystal formation.** *American Meteorological Society Bulletin*, 30(5):194, May **1949.** 3 refs. **DWB**—Various substances for producing nuclei for ice

crystal formation, taking temperature into consideration, are briefly discussed. (*Same item as* C–94, March 1950, *MAB.*) *Subject Headings:* **1. Artificial nuclei 2. Ice crystal formation 3. Sublimation nuclei.**

1950

6H–176 551.574.1

Aliverti, Giuseppina and Lovera, G., **Sui nuclei di condensazione di origine marittima.** [Condensation nuclei of maritime origin.] *Geofisica Pura e Applicata,* Milan, 16(3/4):133–135, April/June **1950.** 4 refs. Italian and English summaries p. 133. **MH-BH**—Calculation of the probable number of saline condensation nuclei taken by the atmosphere from the sea under various conditions. Critical evaluation of similar calculations made by G. C. SIMPSON and by H. KÖHLER. Effect of bubbling and of sea spray discussed. (*Same item as* 2.4–123, April 1951, *MAB.*) *Subject Headings:* **1. Nuclei count 2. Salt nuclei.**—*M.R.*

6H–177 551.574.1:551.509.67

Dobson, G. M. B., **Centenary symposium on physics of cloud and precipitation. Introductory address.** (In: Royal Meteorological Society, **Centenary Proceedings 1950,** p. 34–36. 5 refs.) **DWB**—Summary of recent work on direct deposition of ice on nuclei in supersaturated air, and chain reaction by splintering of ice. (*Same item as* 2.3–121, March 1951, *MAB.*) *Subject Headings:* **1. Ice nuclei 2. Cloud seeding 3. Supersaturation.**

6H–178 551.574.1

Hosler, C. L., **Preliminary investigation of condensation nuclei under the electron microscope.** *American Geophysical Union, Transactions,* Pt. 1, 31(5):707–710, Oct. **1950.** 3 figs., table, 7 refs. **MH-BH**—Droplets condensed on atomized sodium chloride in an expansion chamber gave very large numbers of small nuclei (24% 1–2 $\times 10^{-6}$ cm) on the collecting surface. Average count 76×10^6/cc compared with 2×10^5 with Aitken counter, which misses the smaller nuclei. These small nuclei may be important in condensation. (*Same item as* 2.5–124, May 1951, *MAB.*) *Subject Headings:* **1. Sodium chloride nuclei 2. Electron microscope analysis.**—*C.E.P.B.*

6H–179 551.574.1:551.594.12:551.591

†Junge, Christian, **Das Wachstum der Kondensationskerne mit der relativen Feuchtigkeit** [The growth of condensation nuclei with relative humidity.] *Annalen der Meteorologie,* Hamburg, 3(5/6):129–135, **1950.** 4 figs., 2 tables, 20 refs., eq. German and English summaries p. 129. **DWB, DLC, MH-BH**—A useful summary of the literature. Growth of nuclei and formation of haze begins with R.H. about 70% and increases rapidly above 90% (formulas quoted). In most aerosols, mixed nuclei predominate. The proportion of charged to uncharged nuclei also depends on humidity. Growth curves are modified by presence of impurities, illustrated by curves for HCl. Variations of visibility below 70% are attributed to varying solubility of nuclei. Dry fogs in industrial regions are attributed to oxidation of SO_2 (following AITKEN). (*Same item as* 11–123, Nov. 1950 and 31–239, Nov. 1952, *MAB.*) *Subject Headings:* **1. Nuclei growth 2. Charged nuclei 3. Soluble nuclei 4. Nuclei and visibility.**—*C.E.P.B.*

6H–180 551.574.1:551.573

Kobayasi, A., **On the evaporation of a moving small liquid particle.** *Meteorological Society of Japan, Journal, 2nd, Ser.* 28(11):398–404, Nov. **1950.** fig., 4 tables, 3 eqs. In Japanese; English summary p. 403–404. **MH-BH**—Small droplets of sea water were sprayed into a wind tunnel air current 1.3 m/sec. At three points droplets were caught on oil film and measured. Evaporation at 92, 159 and 206 cm down stream was 77.5, 82.6 and 90.3% of volume of drops. (*Same item as* 2.7–129, July 1951, *MAB.*) *Subject Heading:* **1. Nuclei experiments.**—*C.E.P.B.*

6H–181 551.574.1:551.576

Krastanow, L., **Über eine Grundfrage bei den Kondensationsvorgängen in der Atmosphäre.** [A basic problem on condensation processes in the atmosphere.] *Bulgarska Akademiia na Naukite, Sofia, Doklady,* 3(1):13–16, Jan./March **1950.** refs., eqs. **DWB**—A theoretical development for determination of the rate of formation and energy released in formation of a drop of water on a condensation nucleus, based on formula of BECKER and DÖRING (1935) where it was assumed that nuclei were completely wettable. The author maintains that with different saturation or supersaturation values, different degrees of wettability exist for a given nucleus. (*Same item as* 3.5–233, May 1952, *MAB.*) *Subject Headings:* **1. Nuclei theories 2. Nuclei wettability 3. Drop formation.** —*M.R.*

6H–182 551.574.1:551.510.42:551.594.13(47)

Kulagin, D. I., **Vliianie zapylennosti vozdukha na elektricheskoe sostoianie atmosfery.** [The effect of the dust in the air on the electrical condition of the atmosphere.] *Tashkent. Geofizicheskaia*

Observatoriia, Trudy, 4(5):71–76, **1950.** 2 figs., 4 tables, 10 refs. **DLC**—Observations of dust content of the air made at 7h each day in 1948 at Tashkent Geophysical Observatory are analyzed and compared with observations of electrical conductivity and potential gradient in order to determine the relation between number and size of condensation nuclei and the electric state of the atmosphere in different seasons. At Tashkent there is a winter maximum and summer minimum of dust content. Data for Kew and Watheroo (Australia) show a similar winter maximum of condensation nuclei and conductivity though climatic conditions differ remarkably from Tashkent, which is on the eastern edge of a desert. The relation between the electrical conductivity and number of condensation nuclei is not as simple as might be suspected from the seasonal variation in number of condensation nuclei. The conclusion is that the size of the condensation nuclei, and hence the conductivity of the air, increases with increasing humidity. Hence, although the number of nuclei is at a maximum in winter at Tashkent, the relative humidity is at a minimum in the summer so the conductivity may be low at both seasons and high in the more humid spring and fall. (*Same item as* 5.3–117, March 1954, *MAB.*) *Subject Headings:* **1. Nuclei count 2. Dust nuclei 3. Nuclei and atmospheric electricity 4. Tashkent, U.S.S.R.**—*M.R.*

6H–183 **551.574.1:551.594.2**

Leistner, Walter, **Der Verlauf des luftelektrischen Potentialgradienten und der Kernzahlen beim Durchgang einer Böe.** [The course of atmospheric electric potential gradient and nuclei counts in a squall.] *Annalen der Meteorologie*, Hamburg, 3(7/8):246–248, **1950.** fig., 3 refs. **DWB**—After an introduction on the theory of electric field oscillations during passage of a thunderstorm, author illustrates variations of nuclei and potential gradient in one hour during a squall from NW on 14.2.50. After varying between 35 and 80 v/m gradient rose to 140 v/m, reversed and then rose to 250 v/m at time of squall; after squall, oscillated between − and +. The nuclei counts also showed marked oscillations with maxima accompanying negative gradient, and minima accompanying positive gradient. (*Same item as* 2.1–187, Jan. 1951, *MAB.*) *Subject Headings.* **1. Nuclei and atmospheric electricity 2. Nuclei and thunderstorms.**—*C.E.P.B.*

6H–184 **551.574.1:551.509.67**

Lewis, William, **The importance of artificial nucleation for the production of precipitation.** *New York Academy of Sciences, Transactions, 2nd Ser.*, 12(8):264–267, June **1950. DLC**—The author criticizes the theory upon which is based the belief of the importance of artificial nucleation for producing rainfall. On the basis of a study of the formation of "altostratus" and "cumulonimbus" clouds he concludes that the existence of circulation patterns facilitating sufficient lifting for the production of precipitation will bring about a natural formation of ice crystals and the release of available moisture. (*Same item as* 3.3–78, March 1952, *MAB.*) *Subject Headings:* **1. Nuclei theories 2. Artificial precipitation.**—*I.L.D.*

6H–185 **551.574.1(417)**

Nolan, P. J. and Tedde, P. G., **Condensation nuclei and meteorological elements in Dublin.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 2(4):374–385, **1950.** 3 figs., 4 tables, 16 refs., eqs. English, German and French summaries p. 374. **DWB**—Using a photoelectric nuclei counter (described and illustrated), measurements of size and charge distribution were carried out near center of Dublin and compared with relative humidity and wind speed and direction. Average concentration 124,000/cm³ in winter and 57,000 in spring. Some local differences and effects of wind direction are discussed and attributed to local sources of pollution. With calm and light wind nuclei are larger and have a larger charged fraction. With increasing humidity the total number of nuclei is not affected but the large ion concentration increased; variation agrees with theoretical variation of radius of dilute sulphuric acid droplets. (*Same item as* 2.2–109, Feb. 1951, *MAB.*) *Subject Headings:* **1. Nuclei size 2. Charged nuclei 3. Large nuclei 4. Dublin, Ireland.**—*C.E.P.B.*

6H–186 **551.574.**

Ogiwara, Sekiji (*Tohoku Univ.*), **Crystallization and freezing of aqueous condensation nucleus.** *Tohoku University, Science Reports, 5th Ser., Geophysics*, 4(1):24–30, June **1950.** 3 refs., 32 eqs. **MH-BH**—The purpose of this paper is to consider the processes taking place in a hygroscopic condensation nucleus as a function of change of the meteorological conditions of the surrounding air, namely: (1) The increase of diameter as a function of humidity; transformation into a cloud or fog particle. (2) The crystallization of the hygroscopic substance beginning at sufficiently low humidity. (3) The freezing of the aqueous nucleus when at a temperature lower than that of bulk water. (*Same item as* 4.9–162, Sept. 1953, *MAB.*) *Subject Headings:* **1. Nuclei growth 2. Hygroscopic nuclei.**—*W.N.*

6H–187 551.574.1

Ogiwara, Sekiji, **On the solid condensation nucleus which is not soluble in water, Pt. 3, Studies on the formation of cloud and rain.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 28(11):391–397, Nov. **1950.** 4 figs., 2 tables, 5 refs., 10 eqs. In Japanese; English summary p. 397. **MH-BH**—Author obtained a formula for saturated vapor pressure over a thin film of water on an insoluble nucleus and found that it is lower than that over a water drop of the same size. From this he infers that a solid nucleus larger than 10^{-5} cm radius, once well-wetted, can act as a condensation nucleus. (*Same item as* 2.8–104, Aug. 1951, *MAB.*) *Subject Heading:* **1. Insoluble nuclei.**—*C.E.P.B.*

6H–188 551.574.1:551.508.91(265/6)(52)

Ohta, S., **Investigations on condensation nuclei, Pt. 1–4 (Abstract).** *Geophysical Magazine*, Tokyo, 21(3):208–214, March **1950.** 5 figs., table. **MH-BH**—An improved nuclei counter of Aitken type nuclei is described and diagrams showing its construction are presented. The following topics are discussed: the significance of the wall effect of a nuclei counter, the vertical distribution of condensation nuclei at various heights on Mt. Fuji, and the contents of condensation and uncharged nuclei over the Pacific Ocean and the Sea of Japan. (*Same item as* 11–126, Nov. 1950, *MAB.*) *Subject Headings:* **1. Nuclei instruments 2. Nuclei vertical distribution 3. Japan 4. Pacific Ocean.**—*M.R.*

6H–189 551.574.1(52)

Ohta, S., **On the vertical distribution of condensation nuclei.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 28(6):188–200, June **1950.** 3 figs., 9 tables. In Japanese; English summary p. 200. **DWB**—Observation of Aitken nuclei were made at various heights on Mt. Fuji. Diurnal variation showed a single maximum in afternoon and minimum midnight to early morning. Number of nuclei decreased exponentially with height, most rapidly in winter, with discontinuities at 1000 and 2000 m. There were many spontaneous condensation nuclei in summer. The origin, movements and equilibrium of nuclei are discussed. (*Same item as* 2.3–123, March 1951, *MAB.*) *Subject Headings:* **1. Nuclei vertical distribution 2. Mt. Fuji, Japan.**—*C.E.P.B.*

6H–190 551.574.1:551.576.1

Ouchi, Koo, **On the stability of the ice germs in a cloud (fog) particle.** *Tohoku University, Science Reports, 5th Ser., Geophysics*, 2(3):163–166, Dec. **1950.** 2 tables, 20 eqs. **DWB**—A mathematical study on the subject. This author defines "ice germ" as: "pure ice crystal or the ice-affine (freezing) nucleus covered with thin ice film." Temperature of equilibrium of three phases lies between 0°C and −0.2°C, hence existing ice nuclei (radii larger than 10^{-6} cm) can grow—the cloud droplets freeze—into spheres if the cooling rate is large. If no ice nuclei $>10^{-6}$ cm exist in a cloud, supercooling can easily occur. (*Same item as* 3.9–183, Sept. 1952, *MAB.*) *Subject Heading:* **1. Ice nuclei.**—*W.N.*

6H–191 551.574.1:551.594.13

Pollermann, M., **Die Tröpfchenbildung an Ionen in der Wilsonschen Nebelkammer.** [Formation of droplets on ions in the Wilson condensation chamber.] *Annalen der Physik*, Leipzig, 6th Ser., 5(6/8):329–348, **1950.** 24 figs. **DWB**—During expansion of a Wilson chamber, electrical mobility of ions was continuously measured and occurrence of spontaneous droplet formation followed. The mobility of ions and critical supersaturation for positive ions agreed with VOLMER'S theory. Greatest supersaturation reached did not cause condensation on negative ions. (*Same item as* 7–85, July 1950, *MAB.*) *Subject Headings:* **1. Ion mobility 2. Negative ions.**—*C.E.P.B.*

6H–192 551.574.1:551.510.42

Reeger, E. and Sidentopf, H., **Staubmessungen in der freien Atmosphäre.** [Dust measurements in the free atmosphere.] *Zeitschrift für Meteorologie*, Berlin, 4(4/5):136–140, April/May **1950.** 3 figs., table, 5 refs. **DLC**—The larger solid particles were counted in various ways up to 2200 m above ground with a Zeiss conimeter (apparatus described) in airplane ascents. The mean vertical distribution is the same as for condensation nuclei and haze particles, showing that in lowest 2–3 km there is little sedimentation. In individual flights marked discontinuities occurred at haze limits and inversions. Particles could be counted down to 0.15–0.2μ but as number increased very rapidly with decreasing size, totals have little absolute meaning. Results agree with earlier determinations but a possible source of error is discussed. (*Same item as* 11–48, Nov. 1950, *MAB.*) *Subject Headings:* **1. Nuclei vertical distribution 2. Large nuclei.**—*C.E.P.B.*

6H–193 551.509.66:551.509.67:551.574.1

†Schaefer, Vincent J., **The effects produced by seeding supercooled clouds with dry ice and silver iodide.** (In: Royal Meteorological Society, **Centenary Proceedings, 1950.** p. 42–50. 6 figs.,

15 refs.) **MH-BH**—After a historical introduction, the present field and laboratory studies by Project Cirrus (U.S.A.) are listed. Concentration of ice particles varies from less than 10 to more than $10^7/m^3$; at least 10^4 is required for cloud transformations to occur and persist. Results of seeding are described and illustrated by striking photos. The discussion, p. 63–65, is mainly on this paper. (*Same item as* 2.4–38, April 1951, *MAB.*) *Subject Headings:* **1. Ice nuclei 2. Artificial nuclei 3. Cloud seeding.**

6H–194 551.574.1

Schaefer, Vincent J., **The occurrence of ice nuclei in the free atmosphere.** General Electric Research Laboratory, Schenectady, Contract DA-36-039-Sc-15345, Project Cirrus, Occasional Report, No. 19, **1950.** 7 figs., table, 12 refs. **DWB**—Extended periods of high counts of sublimation nuclei at Mount Washington Observatory between Jan. 1, 1948, and Sept. 1, 1949, are noted. (*Same item as* C–98, March 1950, *MAB.*) *Subject Headings:* **1. Nuclei high counts 2. Sublimation nuclei.**

6H–195 551.574.1:551.577(72)

Woodcock, Alfred H., **Condensation nuclei and precipitation.** *Journal of Meteorology,* 7(2):161–162, April **1950.** 2 tables, 5 refs. **DWB, MH-BH**—The number of condensation nuclei in air over the Florida Coast is much greater than presumed, as evidenced by samples taken recently at 12 m above the sea and at cloud level. Some large hygroscopic particles as well as many minute sea-salt particles are present at all levels giving reason to believe precipitation could occur from seeding by the former. (*Same item as* 8–83, Aug. 1950, *MAB.*) *Subject Headings:* **1. Nuclei over sea 2. Hygroscopic nuclei 3. Florida.**

6H–196 551.574.1

Yamamoto, Gi-ichi and Miura, Akira, **Saturation vapor pressure and size of condensation nucleus.** *Meteorological Society of Japan, Tokyo, Journal,* 2nd Ser., 28(12):432–440, Dec. **1950.** 5 figs., 5 tables, 2 refs., 11 eqs. In Japanese; English summary p. 440. 2 eqs. **MH-BH.** Also in: *Tohoku University. Science Reports, 5th Ser., Geophysics,* 3(1):34–39, April **1951. DWB**—Convenient approximate expressions are derived relating saturation vapor pressure and the size of a nucleus containing a given amount of solute. The effect of adsorption is not considered. (*Same item as* 3.8–140, Aug. 1952; *see also* 2.8–106, Aug. 1951, *MAB.*) *Subject Heading:* **1. Nuclei size.** —*A.A.*

SUPPLEMENTARY MATERIAL

6H–197 551.574.1:551.575.3(47)

Mikhaĭlovskaia, Ada Nikolaevna, **Tumany Leningrada i ego okrestnosteĭ v sviazi s razvitiem promyshlennosti.** [Fog in Leningrad and vicinity in relation to industrial development.] *Zhurnal Geofiziki i Meteorologii,* Moscow, 6(4):307–323, **1929.** 6 tables, foot-refs. German summary p. 322–323. **DLC**—The author analyzed the influence of combustion nuclei content in the air, on fog and haze frequency. Observations made in Leningrad, its suburbs, and in Slutsk have been used for comparing the 5 year periods: 1910–1914—a period of highly developed industrial activity, and 1917–1921—period of revolution when there was an industrial standstill. It has been found that the annual amount of fog days diminished by 32 days during the second period in Leningrad and suburb, but in Slutsk, a small town close by, it did not change much. *Subject Headings:* **1. Combustion nuclei 2. Nuclei and fog 3. Fog variations 4. Leningrad, U.S.S.R.**—*N.A.S.*

6H—198 551.574.1:551.594.13

Val'ta, Z. F., **Priroda i podvizhnost' vozdushnykh ionov.** [The nature and mobility of ions in the atmosphere.] *Zhurnal Geofiziki i Meteorologii,* Moscow, 6(3):181–215, **1929.** 10 figs., 3 tables, foot-refs., 7 eqs. **DLC**—Mobility of ions in an electric field of 1 volt has been studied on the basis of gas kinetic theory, which enables the computation of mass, size and structure of ion from the mobility data. The theories of ion mobility were classified by Loeb into three groups: The first group of theories assumes that ions and the surrounding molecules are elastic spheres interacting by central forces. Lenard suggested a formula showing the relationship between the mobility of ion, its mass, and the free motion distance. Langevin, Ricke and J. J. Thomson introduced similar formulas varying in the rate of dependence from the mass of ion. The second group of theories analyzes the effects of the ion charge. Loeb's formula relates the mobility of the ion to dielectric constant, gas density, molecular masses and ion mass. Langevin's formula is only slightly different. The third group of theories combines the first two. The expressions for ion mobility are very complicated. Methods for determining the mobility of ions are reviewed and groups of ions, according to their mobility, are given in a table. A new method for determining mobility, using the apparatus made according to ideas of V. IA. Altberg, is described. The main advantage is the possibility

of measuring the very young ions, younger than 10^{-4} sec. Dependence of the mobility of positive ions on their age has been verified and graphs showing higher mobility rates with decreasing age are presented in a form similar to that used by ZELENY. *Subject Headings:* **1. Ion mobility 2. Ion theories 3. Ion experiments 4. Literature reviews.**—*N.A.S.*

6H–199 551.574.1

Yunker, E. A., **The diurnal variation and vertical distribution of atmospheric condensation nuclei.** *Terrestrial Magnetism and Atmospheric Electricity*, 45(2):121–126, June **1940.** 3 figs., table, 8 refs. **DLC**—The diurnal variation and vertical distribution of atmospheric condensation nuclei have been determined with recording cloud chamber apparatus. The results show an increase of nuclei density with height in accordance with the suggestion of GISH and tentative vertical density distribution curves are proposed. The studies give further support to the convective theory of diurnal variation suggested by previous work. The variation of nuclei density with wind direction suggests a maritime origin for at least a portion of the nuclei. *Subject Headings:* **1. Nuclei diurnal variations 2. Nuclei vertical distribution.**—*Author's abstract.*

6H–200 551.574.1:551.594.13

Yunker, E. A., **The mobility-spectrum of atmospheric ions.** *Terrestrial Magnetism and Atmospheric Electricity*, 45(2):127–132, June **1940.** 3 figs., 5 refs., 2 eqs. **DLC**—The mobility-spectrum of atmospheric ions has been measured in the range of mobilities between 2.0 cm/sec/volt/cm and 10^{-3} cm/sec/volt/cm using a divided electrode air-blast method. A continuous recording method was employed and the entire spectrum covered in about one hour. The spectrum shows the ordinary small ions, a group of ions at a mobility of about 0.5, and then a practically continuous distribution out to the lowest mobilities measured. The group having a mobility of 0.5 may be correlated with laboratory experiments of CHAPMAN in which ions of this character were formed in the spray of dilute salt solutions. Simultaneous continuous measurements of the variation of density of condensation nuclei lead to a lower limit for the size of the nuclei measured in the cloud chamber of diameter 3.3×10^{-6} cm. *Subject Headings:* **1. Ion mobility 2. Nuclei instruments.**—*Author's abstract.*

6H–201 551.574.1:551.594.12

Fuchs, N. A., **O velichine zariadov na chastitsakh atmosfernykh aerokolloidov.** [Magnitude of electrical charges carried by the particles of atmospheric aerocolloids.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. i Geofiz.*, 11(4):341–348, **1947.** 2 figs., table, 18 refs., 10 eqs. Summary in English p. 348. **DLC**—A method for the computation of the probability of collisions between gaseous ions and atmospheric particles (condensation nuclei and water droplets) is given, based on SMOLUCHOWSKY's theory of collisions between Brownian particles. As far as relatively large droplets in fogs and clouds are concerned, only the Coulomb forces between the ions and the charged droplets must be considered in the calculations, but in the case of small condensation nuclei the mirror forces must be also taken into account. From the expression for the probability of collisions (i.e. recombination coefficients) the distribution of charges on the particles of different sizes in the stationary state is derived. For large particles ($a>10^{-5}$ cm) this distribution is expressed by BOLTZMANN's equation. The magnitude of the charges is independent of the ionic concentration. The theory is corroborated by experiments performed on oil droplets ranging from $a=0.15\times10^{-4}$ to 2×10^{-4} cm, charged in a highly ionized atmosphere. The values of the ratio: charged/uncharged condensation nuclei in the atmosphere found by a number of authors, are also in good agreement with the theory. Lower values found by some authors indicate that the life-time of the nuclei concerned was much shorter than the time (approximately one hour) needed for the establishment of a practically stationary state. The presence of a few percent of doubly charged nuclei in the atmosphere can be inferred from the theory, in agreement with experimental results. *Subject Headings:* **1. Charged nuclei 2. Nuclei theories 3. Ions.**—*Author's abstract.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodical included in this section are for information only and will not be listed in the monthly indexes until abstracted. When material is furnished in advance of date of publication, the pagination may be omitted.

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Seyfert, F.: **Die Bedeutung phänologischer Beobachtungen für die Imkerei,** [The importance of phenological observations for bee-keeping], 155–157

Annalen der Meteorologie, Hamburg, Vol. 6, No. 7/8, 1953/1954

Roll, Hans Ulrich: **Beaufortäquivalente auf See bei verschiedenen thermischen Schichtungen, angewendet auf die Bestimmung der Windschubspannung an der Meeresoberfläche,** [Beaufort equivalent at sea for various thermal stratifications applied to the determination of wind stress on the sea surface], p. 193–201

Goedecke, Erich: **Über Intensität und Reihenfolge der Eiswinter an der deutschen Nordseeküste für die Periode 1872–1950,** [Intensity and sequence of ice winters on the German North Sea coast for the period 1872–1950], p. 202–213

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